

Bowdren, M. E. Five case studies of arithmetic failures

1939

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Five Case Studies of Arithmetic Failures

Submitted by

Marion Ellen Bowdren

B. S. in Education, Boston University, 1930

In partial fulfillment of the requirements for
the degree of Master of Education

1934

First reader - Guy M. Wilson, Professor of Education
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II. Case I.

School History

Character of Child

Causes of Failure

Procedure

Remedial Work

Summary of Case I

Summary Record of Tests and Results

III. Case 2.

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They are of mixed intelligence. They live in a small suburb of Boston that is almost country-like in aspect. The community in which they live is restricted to single houses of the better type. The children come from comfortable homes and enjoy many advantages. They attend a local school, equipped with every convenience and facility for all to their will being.

Problems as children present themselves, it is known that at the time they arrived in the upper elementary grades, were normal children, and even those of very high ability, are failures in arithmetic (1). That success is possible for these children and even those of lower intelligence, has been proven at the present time by the success obtained through individual treatment (2). Failure in these cases may be attributed to: 1. inadequate motivation, 2. poor methods of teaching, 3. lack of judgment in choice and management of subject matter. A pupil's failure is not accounted for by one reason fail, but rather by an accumulation of small failures, each building up an obstacle that gives the child an increasing sense of insecurity in his own ability.

It is the purpose of this study to trace out the factors

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I. Introduction

These five children whose failures in arithmetic have been the basis of this study, are in the fifth and sixth grades. They are of normal intelligence. They live in a nearby suburb of Boston that is almost country-like in aspect. The community in which they live is restricted to single houses of the better type. The children come from comfortable homes and enjoy many advantages. They attend a new school, equipped with every convenience and facility to add to their well being.

Problem. As children proceed thru school, it is noticeable that by the time they arrive in the upper elementary grades, many normal children, and even those of very high ability, are failures in arithmetic (1). That success is possible for these children and even those of lower intelligence, has been proven at the present time by the success attained through improved teaching methods (2). Failure in these cases was apparently due to: 1. inadequate motivation, 2. poor methods of teaching, 3. lack of judgment in choice and management of subject matter. A pupil's failure is not accounted for by one sudden fall, but rather by an accumulation of small failures, each building up an obstacle that gives the child an increasing sense of insecurity in his own ability.

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- (1.) Souba, A. Diagnosis of Pupil Differences in Arithmetic Master's Dissertation, University of Minnesota, 1924
- (2.) New England Experiment, 1925-28, Guy M. Wilson Contest Chairman, Supported by Reports from Lynn, Newton, Mass.

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Method. The failure of these children to obtain arithmetic success may have been due to any one or more of several causes. Supt. Weet, of Rochester, N. Y., (1.) found that the beginnings of failure are due, to a large extent, to mental conditions, wrong attitudes, irregular attendance, physical conditions, environment, or administrative difficulties.

Since the causes of failure in the child can be traced out, it is the purpose of this study to effect it by the following method used by Brownell (2) and Gabbert (3):

1. Conferences with parents
2. Inventory tests
3. Diagnostic tests
4. Personal contact with child outside of school
5. Remedial work

The last point includes systematic drill, which if properly used in the first place, would have prevented failure.

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- (1) Supt. of Schools, Weet, Rochester, N. Y., 1928. Work of the Public School, Board of Education. Referenced by Brueckner & Melby, Diagnostic and Remedial Teaching, Houghton, Mifflin Co., 1931 pp.5
 - (2) William Brownell, Peabody Journal of Ed. Sept., 1929, pp. 100-103
 - (3) Mary Gabbert, Peabody Journal of Ed., Nov., 1929, pp. 147

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The cause of failure can be traced from (1) conference with parent and (4) personal contact with child outside of school, but (2) Inventory tests and (3) Diagnostic tests will prepare the way for (5) remedial work and systematic drill.

Conferences with parents and children, show that they have felt the stigma of failure and know approximately its cause and the time it became noticeable. These conferences helped to establish a feeling of mutual interest between the school and home that was satisfying to both. It created a spirit of cooperation that did much to aid in tracing out the real causes of failure and establishing a basis for overcoming it.

Inventory tests showed how much of a foundation was present and what facts were necessary in order to obtain 100% results.

The Diagnostic tests aided in tracing process difficulties and analyzing them in order to correct the procedure errors.

The remedial work and systematic drill in each case, was planned, following study of the inventory and diagnostic tests, and the suggestions from parents and child. This remedial work varied according to the ability and needs of the child. In this study, involving the four fundamental processes, one hundred percent accuracy results were demanded, and although the work was individualized, the same attainment level was expected of each of the five children.

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Historical Sketch. Strayer, (1) in 1911, said that the failure of children in the elementary school was caused to a large extent by: late entrance, mental immaturity, illness, frequent change of schools, and poor teaching. At the time of his comprehensive survey, it was discovered that 57% of the children in public schools were of normal age, 19% were one year over age, 10% were 2 years over age, 4% were 3 years over age and 2% were 4 years retarded. At that time, 1911, according to this study, 35% of the school population were over age, as against 4% that were under age. This study strongly suggested the need of changes in the curriculum to provide for the less capable pupils.

In 1928, 17 years later, Supt. Weet, (2) of Rochester, N. Y., found practically the same situation prevalent in twelve of the schools of that city.

54% of the pupils were of normal grade

39% were overage

6% were underage

Other facts the country over, indicate that the schools were slow in making provision for adjustment of school work to pupil ability and pupil needs.

However, gradually, leading educators, such as Thorndike, McMurray, Ayres, and others, began to realize the necessity of elasticity of the curriculum to meet the needs of the child, rather than trying to change the child to conform to the requirements of the curriculum. This meant radical changes to

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suit the capabilities of all children and tended gradually to reduce failure and retardation. Modifications were imperative to take care of those of lower mentality. Minimum essentials were drawn up to provide a lightening of their achievement load. Enrichment was given those of greater ability. However, it was found that this did not entirely clear up the trouble. Children of like ability vary from one subject to another (1). Individual differences of those of equal general intelligence, had to be taken into consideration. Not only must the intelligence of the child be considered, but also his special abilities in different subjects. His emotional characteristics all vary (2) and these also must be considered. Grouping must be made, and then the work further adapted to the individual of the group if consistent success is to be obtained.

This advanced idea led to the individual instruction movement that has been notably developed by Carleton Washburne, of Wenetka, Illinois, (3) and in school systems throughout the country. In these various schemes, the work is broken up into work units that are accomplished individually by the child.

The ideal of education in a democracy, is to have each child working to the maximum of his capacity and securing

(1) Brueckner and Melby. Diagnostic and Remedial Teaching Houghton Mifflin Co., 1931 pp. 31

(2) Courtis. 24th Yearbook of National Society for the Study of Education. pp. 112-113

(3) 24th Yearbook of National Society for the Study of Education. pp. 39

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(3) 24th Yearbook of National Society for the Study of Ed-
ucation, pp. 33

training, best fitting him for life's work. This ideal was many times trampled on in the teaching of arithmetic. Arithmetic formerly used up one-fourth of the school day, employed much useless material and had too much failure. Some considered it to be a good form of mental discipline.

The trend from the old to the new arithmetic curriculum, was essentially important. Even as early as 1904, Dr. McMurray (1) felt that much of the subject matter taught was superfluous. It was his belief that arithmetic should be based largely on life situations. This replacement of the formal type would tend to drive out much of the obsolete material.

Wilson (2) in 1918, by means of 14,583 problems from 4068 adults, showed the few arithmetic processes necessary. Most addition and subtraction problems were of two or three place numbers. Most multiplication was done with a one figure multiplier.

Carl Wise (3) in 1919, made a similar survey covering many states, that plainly showed how much useless arithmetic material was presented as compared with the amount necessary.

Woody (4) in 1922, made a survey by analyzing the bills from three large retail stores that showed the small amount of figuring necessary in everyday life and business.

(1) McMurray, F. M. N. E. A. Proceedings, 1904

(2) Wilson, Guy M. Social Business Usage of Arithmetic, Teacher's College Contributions in Education. No. 100

(3) Wise, Carl T. Elementary School Journal, Oct., 1923. pp. 260-62

(4) Woody, Clifford Elementary School Journal, March, 1922
pp. 505-20

(4) Woody, Clifford. Elementary School Journal, March, 1933

(3) Wise, Carl T. Elementary School Journal, Oct., 1933.
pp. 280-82

(2) Wilson, Guy M. Social Studies Usage of Arithmetic.
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(1) Murray, F. M. N. E. A. Proceedings, 1904

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A committee of experienced superintendents at the University of Washington (1) during the summer of 1922, came to the following significant conclusions:

1. The arithmetic needs of the public are simple.
2. All of the useless material in the curriculum should be eliminated.
3. Arithmetic problems should be vital ones, taken from actual life experiences.
4. The basis of arithmetic taught in the schools should be governed by the arithmetic needs of the community.

The National Educational Association Proceedings (3) report, stated that in the interests of childhood, of reasonable economy, and of a broader and better social progress in the schools, arithmetic needed a thorough reorganization. This need had been felt by Dr. McMurray (4) as far back as 1904. Studies on social usage had all shown primarily the same thing--the amount of arithmetic required in the schools as compared to that necessary for life situations.

Combinations of various lines of work have resulted in new standards in arithmetic and the elimination of useless

(1) N. E. A. Proceedings Report 1923-24 pp. 10-30

(2) Morton, R. L. Teaching Arithmetic in the Intermediate Grades. Silver Burdett Co., 1927. pp. 2

(3) N. E. A. Proceedings Report 1923-24 op. cit.

(4) Dr. McMurray op. cit.

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materials. Once the unnecessary materials, as shown by the survey, had been discarded from the curriculum, provisions had to be made so that the children of all abilities would be provided for. This situation necessitated grouping on the basis of maturity and educability, rather than on the grade-age level. Today the public schools seek to care for the children according to their ability and needs. The failure child is not so prevalent in arithmetic because of these new standards and experiments (1) (2) have proven that failure can be reduced to the vanishing point by more effective methods of teaching.

The present study of five failing children in arithmetic has kept in mind some such background of Educational History as has been reviewed in this brief introduction. The assumption has been made that these normal children could be changed from failure to success in the fundamentals of arithmetic. The following pages record the procedure and the results.

(2) 20 Reading Grade

(3) 22 Reading Quotient

(1) Souba A. op. cit.

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II. Case Study 1. Stanley

The following is significant data relating to Stanley when I began to study his arithmetic case in the fall of 1932.

Dearborn Intelligence	(1) CA 11-6	(2) MA 12-1	(3) IQ 106
Stanford Achievement	CA 10-4	(4) EA 11-7	(5) EQ 111
Morrison McCall Spelling	CA 11-4	(6) SA 11-6	(7) SQ 102
Sangren Woody Reading	CA 11-9	(8) RG 5.92	(9) RQ 122

Reference terms 1-9 in paragraph above found in McCall, How to Experiment. MacMillan Co., 1923 p 276

- (1) CA Chronological Age
- (2) MA Mental Age
- (3) IQ Intelligence Quotient
- (4) EA Educational Age
- (5) EQ Educational Quotient
- (6) SA Spelling Age
- (7) SQ Spelling Quotient
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(1)	CA	Chronological Age
(2)	MA	Mental Age
(3)	IQ	Intelligence Quotient
(4)	EA	Educational Age
(5)	EQ	Educational Quotient
(6)	SA	Spelling Age
(7)	SG	Spelling Quotient
(8)	RG	Reading Grade
(9)	RQ	Reading Quotient

School History. Stanley, at the beginning of the sixth grade, was failing in arithmetic. In fact it was the end of the second grade since he had had a passing mark in arithmetic. Every year he had been promoted with a failure in this subject. He had developed the attitude that it was all right to fail in arithmetic because one gets promoted anyway.

This belief started at the end of the third year and each promotion with its accompanying D in arithmetic, only strengthened the belief and its accompanying attitude. As his other subjects were of satisfactory grade, the rule of the school did not permit non-promotion. Stanley could not attend summer school because the requirements for attendance were non-promotion and two D's

Character of Child. Stanley is a dreamy type of child, not given to violent acts of any kind. He is never over-enthusiastic about anything, yet he is not prone to strong dislikes. He is a middle-of-the-road child. He is sociable to a certain extent, but draws the line against undue familiarity.

On the play ground, he will join in organized play but seems to enjoy himself more if left to his own diversion with a few chosen companions. He is not boisterous, but cannot be considered quiet.

He is a likeable child and well thought of by his school-mates. He has a lack of faith in his own ability--a thing that has been much strengthened at home by endless open dis-

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cussions of his failures.

Stanley's father is a musician in a moving picture theatre in Boston. He is very seldom at home when the children are free so that on week days he has very little contact with them on their lessons.

Stanley's mother was a school teacher before marriage. She admits a lack of patience. She considers teaching an awfully hard job. The mother is a very pleasant person to meet and talk with. She seemed more than willing to help the child at home.

Richard, the other member of the family is in the ninth grade. He is a very earnest student and has never had scholastic difficulties. His school work takes up a major part of his time.

Cause of Failure. In the first grade, Stanley was absent from school a great deal. His teacher was absent also for two months. The inexperienced substitute never could, through lack of time, make up the work which Stanley missed. He was backward in reading in this grade so there was some discussion as to his promotion. His mother gave him much outside help in reading and this strengthened him enough to warrant trial in the second grade.

In the second grade it was found that beside being slow in reading, his arithmetic was quite deficient. However, again he managed to be promoted.

It was in the third grade that real difficulties became

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apparent and the trouble in arithmetic became pronounced. The arithmetic facts were not known. However, Stanley by working after school and at home, straightened out his addition requirements for the grade. Nothing was done with subtraction. In this third grade, multiplication was successful because the tables were thoroughly learned and addition no longer presented a barrier.

Trouble started afresh in the fourth grade with division. The division facts were not thoroughly familiar and subtraction was a severe handicap. There was nothing done in this grade to remedy the situation.

Fractions, in the fifth grade were difficult and due to the sense of failure received in the fourth grade, Stanley was content to sit and listen to the recitation of the other class, rather than try to overcome what seemed to him an impossible obstacle. The D he received that year in arithmetic was his third successive one in arithmetic.

His status on entering my room to begin the sixth grade, may be properly described as the "I don't care" attitude. Success pleased him but not sufficiently to make him work extremely hard.

Procedure. Stanley was very much interested in the Boy Scouts, having joined at the beginning of the year. He was most anxious to pass his Scout tests and be allowed to go on trips with his group. I suggested that he perform his "Good Deed" on himself, as he would travel far before he

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found anyone needing aid as badly as he did. He didn't know if this was permissible, but decided, nevertheless, to let his arithmetic be the recipient of at least one "Good Deed" a day.

When shown how few combinations he had to work with in each of the four processes, he was more than anxious to improve.

Most of what we termed his "Good Deeds" in reality, remedial work, was done during school hours. There was no use attempting new work without a strong foundation.

Failures, even though seldom, were very discouraging to him, but once started, he kept working until he had secured mastery of the four fundamentals. Every morning, during the regular arithmetic period, Stanley went into an empty room and worked by himself on some one of the difficulties that had been uncovered in the Wilson Process Tests. A member of the class who was reliable was sent in five minutes before the end of the period to check his board work or flash cards. All examples that were incorrect were left on the board for a later analysis of trouble. Combinations that were not known were studied from flash cards. A Standard Service Set of arithmetic books were utilized for examples.

Even after the remedial work was completed Stanley worked individually to catch up with his class. Explanations were given and the work assigned before school opened in the morning. Necessary corrections of errors were made at noon time

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In the tests given the child, no exact record was kept of the time element. It was the degree of accuracy that was sought and the time was not going to be used in comparison with the given time medians.

Remedial Work. Addition was the first process worked on. By means of the (1) Wilson Process Inventory and Diagnostic Test in addition, I found that the primary combinations were known, but the upper decade facts, such as: $37 + 9 = 48$, $19 + 8 = 46$, and two or three addends, both 2 and 3 place carrying, sum of left hand column less than 10 no zeros, and adding dollars and cents. Such examples as the following types gave the most trouble:

56	6	\$1.10
227	18	.15
<u>394</u>	<u>484</u>	6.75
		1.20
		.08
		<u>4.52</u>

Using the outline and some of the drill material found in (2) Wilson 100% Accuracy in Fundamentals, the addition process was worked on. The facts were studied at home from flash cards. The process difficulties to be drilled on in school time, were explained, one at a time before school in the morning.

On the Wilson (3) Inventory and Diagnostic Tests in addition, the results showed complete knowledge of both the

- (1) Wilson Process Inventory and Diagnostic Test in Arithmetic University Publishing Co.
- (2) ~~Wilson 100% Accuracy in the Fundamentals of Arithmetic~~ University Publishing Co., 1928
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21.10	8	28
.15	18	327
6.75	<u>484</u>	<u>384</u>
1.30		
.08		
<u>4.23</u>		

Using the outline and some of the drill material found

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Addition Tests Results

(Wilson Tests Used as Previously Noted)

Date	Test	Score	Penalty Score
10/10/32	3P Addition Process	67	10
10/27/32	3A Easier Primary Addition Facts	100	
10/27/32	3B Difficult and Zero Combinations	100	
10/28/32	3C 300 Decade Combinations to $39 + 9$	100	
10/28/32	3D 175 Decade Combinations as Needed for Carrying in Multiplying to 9×9	99	

Subtraction Test Results

Date	Process	Score	Penalty Score
10/32/32	4P Subtraction Process	84	10
12/5/32	4A 50 Simple operations no borrowing	100	
12/5/32	4B 45 Combinations requiring borrowing	100	
12/5/32	4C 200 Subtractions with re-borrowers as needed for short division	100	

(1) Wilson Process Inventory and Diagnostic Tests in Arith., pp. 513.

(2) Wilson Process Inventory and Diagnostic Tests in Arith., pp. 514.

facts and the process.

Addition Tests Results

(Wilson Tests Used as Previously Noted)

Date	Test	Score	Penalty Score
10/10/32	3P Addition Process	87	10
10/27/32	3A Easter Primarily Addition Facts	100	
10/27/32	3B Difficult and Easy Combinations	100	
10/28/32	3C 200 Decade Combinations to 32 + 8	100	
10/28/32	3D 175 Decade Combinations as Needed for Carrying in Multiplying to 8 x 8	99	

Real trouble was encountered in subtraction. The Wilson Process Inventory and Diagnostic Test (1) with its penalty score, again showed that only the primary combinations were perfect. Examples such as:

156 Gaps or dangling	600 Zeros in the min-
<u>42</u> lefts--no borrowing	<u>149</u> uend and double borrowing
1402 Vanishing lefts	\$4.98 Dollars and cents with double
<u>804</u> double or triple borrowing	<u>.99</u> or triple borrowing, zeros, gaps, and vanishing lefts

were found to cause a great deal of the trouble. Flash cards were used for drill on the subtraction facts. These were completely mastered before drill on the process difficulties was begun. The results on the Wilson Inventory and Diagnostic Tests (2) in subtraction, show the work was mastered.

Subtraction Test Results

Date	Process	Score	Penalty Score
10/32/32	4P Subtraction Process	34	10
12/5/32	4A 55 Simple operations no borrowing	100	
12/5/32	4B 45 Combinations requiring borrowing	100	
12/6/32	AC 200 subtractions with remainders as needed for short division	100	

- (1) Wilson Process Inventory and Diagnostic Tests in Arith. op. cit.
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Date	Process	Score	Penalty Score	
10/30/32	4P Subtraction Process	34	10	
12/5/32	4A 55 Simple operations no borrowing	100		
12/5/32	4B 45 Combinations requiring borrowing	100		
12/8/32	4C 200 Subtractions with re- mainders as needed for short division	100		

The multiplication tables were known in table form, but drill was necessary to instill the facts thoroughly and thus eliminate the table form. In this process no inventory or diagnostic tests were employed. Flash cards were used and after the facts were known, extra numbers would be given orally to be added to the answer on the card thus drilling two processes at one time. This aided the child in the carrying process later encountered. The flash cards were not only in the times (x) form, but also left with blank spaces: $4 \times ? = 28$, $? \times 7 = 42$, $\frac{36}{9} = ?$ This aided the even and uneven division later. Since addition had been established and the multiplication facts known, this process gave no unusual trouble. The Wilson Process Inventory and Diagnostic test (1) with its score of 96 was not begun until after four o'clock and fatigue rather than ignorance of fact and method caused the lowering of the 100% standard. The four mistakes were made in Group 10, but were found by the child on inspection and corrected.

Multiplication Test Results

Wilson Process Inventory and Diagnostic Test

Date	Test	Score	Penalty Score
12/22/32	5P	96	90
1/8/33	5P	87	80
2/17/33	5P	98	90

(1) Wilson Process Inventory and Diagnostic Test in Arith.
op. cit.

The multiplication tables were known in table form, but drill was necessary to install the facts thoroughly and thus eliminate the table form. In this process no inventory or diagnostic tests were employed. Flash cards were used and after the facts were known, extra numbers would be given orally to be added to the answer on the card thus drilling two processes at one time. This aided the child in the carrying process later encountered. The flash cards were not only in the times (x) form, but also left with blank spaces: $4 \times 7 = 28$, $7 \times 7 = 49$, $\frac{35}{5} = 7$. This aided the even and uneven division later. Since addition had been established and the multiplication facts known, this process gave no unusual trouble. The Wilson Process Inventory and Diagnostic test (I) with its score of 98 was not begun until after four o'clock and figures rather than ignorance of fact and method caused the lowering of the 100% standard. The four mistakes were made in Group 10, but were found by the child on inspection and corrected.

Multiplication Test Results

Wilson Process Inventory and Diagnostic Test

Date	Test	Score	Penalty Score
12/22/28	SP	98	90

When the Wilson Process Inventory and Diagnostic test in (1) short division was given, in spite of the drill given, when the multiplication facts were being learned, the score was only 67. This was very disappointing to Stanley, but a further analysis revealed that almost without exception the mistakes were caused by zeros.

$$0 \overline{)9} \quad 7 \overline{)3} \quad 7 \overline{)21.07} \quad 4 \overline{)20.28} \quad 6 \overline{)6015} \quad 7 \overline{)2803}$$

Once this serious difficulty had been taken care of, work progressed very rapidly. The work with one figure divisors was done by the long division process in order to thoroughly familiarize the child with the process. A set plan of procedure was written out for the various steps until they became almost automatic. Two figure divisors were then introduced, first by 10, 11, 12, then by 21, 22, 31, 42, etc. At the end of five weeks, the (2) Wilson Process Inventory and Diagnostic test for long division was given with a score of 98. There was only a slight subtraction error in the last operation that caused the loss of perfection in this test.

Long division no longer was a "mixed up thing that never came out right". "It was fun", according to Stanley.

Division Test Results

Wilson Process Inventory and Diagnostic Tests

Date	Test	Score	Penalty Score
1/6/33	6P ₁	67	20
2/17/33	6P ₂	98	90

(1) Wilson Inventory and Diagnostic Test in Arithmetic op. cit.

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When the Wilson Process Inventory and Diagnostic Test in (1) report division was given, in spite of the drill given when the multiplication facts were being learned, the score was only 67. This was very disappointing to Stanley, but a further analysis revealed that almost without exception the mistakes were caused by errors.

0 1 2 3 4 5 6 7 8 9
 10 11 12 13 14 15 16 17 18 19
 20 21 22 23 24 25 26 27 28 29
 30 31 32 33 34 35 36 37 38 39
 40 41 42 43 44 45 46 47 48 49
 50 51 52 53 54 55 56 57 58 59
 60 61 62 63 64 65 66 67 68 69
 70 71 72 73 74 75 76 77 78 79
 80 81 82 83 84 85 86 87 88 89
 90 91 92 93 94 95 96 97 98 99

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Division Test Results

Wilson Process Inventory and Diagnostic Tests

Date	Test	Score	Penalty Score
1/8/33	87	67	20
2/17/33	87	98	90

Although by the middle of February, Stanley had completely mastered the four fundamental processes, it is to be remembered that he had done no sixth grade work. He now faced the task of doing that work in time to rejoin the class for the year's review beginning the middle of April. Here, as before, he worked alone, help being given him outside of school. Much of the time he was obliged to take home work so that all requirements would be completed in April. He worked very hard and earnestly. He no longer dreaded arithmetic. It was a real pleasure to him, to know that no longer could you "catch him" in arithmetic.

Stanley had been shown how few combinations were needed to master arithmetic but there were times, I think, when he felt these "few facts" were just used as a bait to lure him on. He really expected to have some new ones introduced all through the addition and subtraction work. It seemed impossible to him that arithmetic that had always been so terrifying could be made up of such a small number of easy things. After the study was completed he was indignant at the fact that no one in previous grades had ever taught him arithmetic.

The middle of May, the Wilson (1) General Survey Test in Arithmetic, Form 2, was given to the five children being studied. Stanley's mark was 122 out of 125 problems correct; a very creditable showing and one that brought much gratification not only to the child, but to me as well.

(1) Wilson General Survey Test, Form 2, University Pub. Co.

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As has probably been noted, nothing had been done with fractions because of the lack of time. After a conference with Stanley's mother, it was agreed that this phase of the work could easily be conquered during the summer vacation. The work was outlined and an arithmetic book sent home. In view of the child's enthusiastic attitude, I knew the work would be successfully accomplished.

I was not disappointed. In September, when Stanley returned the book, he brought in a batch of his corrected papers. The lowest mark was one eighty-seven; the rest of the marks were either one hundred or high up in the nineties. These papers had been corrected by Richard, the older brother, and I was informed in a voice loud with praise, "He's fussy about everything." "He likes arithmetic, just like I do."

Summary of Case 1. Stanley, when the study was started, was a discouraged and disgruntled boy. He enjoyed school work but the arithmetic period spoiled it all. Once the daily arithmetic period was over, his feeling of panic left him and his self-confidence returned.

When the study was suggested to him, he was not exactly jubilant, but he was willing to try anything that would help him improve his arithmetic. In view of his habit of listening to other recitations, we decided that he would accomplish more if he worked by himself in a quiet room until he had made up the necessary ground work. Never for a minute did he think that it would be April before he would be back with the rest

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of his class for daily work. He thought it would be only a matter of a month or more.

It is possible that he could have worked with the rest of his class for daily work and made up the foundation work outside of school hours. In view of his confusion I deemed it wiser to give him a chance to be successful and sure of his own ability, before he entered class work again. His self-confidence grew surprisingly after each successful completion of a process. He was no longer indifferent. He did care, very much now, in fact, whether he passed arithmetic. It became a vital matter to him. In March, he began to worry as to whether he would be able to finish the sixth grade work in time. He felt he would have to work harder than ever in order to accomplish this. It became a matter of pride with him and he talked about it incessantly at home. Arithmetic had at last become important to him.

Stanley entered Junior High School secure in a new found faith in his own ability to do arithmetic. Doubts no longer disturbed him. He was as good in it as the rest of the class and intended to remain that way.

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Summary Record of Tests and Results

Wilson Tests Used as Previously Noted

	Date	Test	Score	Penalty Score
1.	10/10/32	3P Addition Process	67	10
2.	10/27/32	3A Easier Primary addition Facts	100	
	10/27/32	3B Difficult and Zero combinations	100	
	10/28/32	3C 300 Decade combinations to $39 + 9$	100	
	10/28/32	3D 175 Decade combinations as needed for carrying in multiplication to 9×9		
3.	10/31/32	4P Subtraction Process	34	10
4.	12/5/32	4A 55 Simple operations no borrowing	100	
	12/5/32	4B 45 Combinations requiring borrowing	100	
	12/6/32	4C 200 of 211 subtractions with remainders as needed for short division	100	
5.	12/22/32	5P Multiplication Process	96	90
6.	1/6/33	6P Short Division Process	67	20
	2/17/33	6P ₂ Long Division Process	98	90
7.	5/15/33	Form 2 General Survey Test (122)(Possible Score 125)		

Summary Record of Tests and Results

Wilson Tests Used as Previously Noted

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1.	10/10/32	3P Addition Process	87	10
2.	10/27/32	3A Easier Primary Addition Facts	100	
	10/27/32	3B Difficult and Zero combinations	100	
	10/28/32	3C 300 Decade combinations to 32 + 9	100	
	10/28/32	3D 175 Decade combinations as needed for carrying in multiplication to 9 x 9		
3.	10/31/32	4P Subtraction Process	84	10
4.	12/5/32	4A 25 Simple operations no borrowing	100	
	12/5/32	4B 45 Combinations re- during borrowing	100	
	12/6/32	4C 300 of 311 combinations with remainders as needed for short division	100	
5.	12/22/32	5P Multiplication Process	98	20
6.	1/6/33	6P Short Division Process	87	20
	2/11/33	6R Long Division Process	98	20
7.	5/15/33	Form 3 General Survey Test (125) (Possible Score 125)		

III. Case 2. John

The following is significant data on Case 2. These results were obtained from the Dearborn Group Intelligence test given in May, 1932.

(1.) CA 10-6

MA 9-9

IQ 93

School History. John entered school at the age of six and his scholastic trouble started in the first grade. He was always the last one to finish with everything, consequently, at the end of the first grade, he was still just a little back of the rest of his class. Things were the same at the end of the second grade. He had not fully completed second grade work but he was promoted.

In the third grade, he failed because of the extremely poor quality of his work in arithmetic and reading, and was sent to summer school. At summer school he failed to complete the requirements necessary for promotion to fourth grade so came back to start third grade again.

John had been sent to summer school with another little, boy, a talkative youngster. This boy had seemingly talked himself into promotion and John's father felt that John had probably accomplished as much as the loquacious boy who had been promoted, so in January John was given a chance at fourth grade work. Whether due to disgust or despair on the

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School History. John entered school at the age of six

19 23

MA 2-2

(1) CA 10-8

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III. Case 2. John

fourth grade teacher's part, he was promoted to grade five after spending five months in the fourth grade.

In the fifth grade, arithmetic was again his failure but a child cannot be held back unless he has two failing subjects, so John was promoted to the sixth grade. In September and October, he was also found to be extremely poor in reading, and consequently, history and geography.

Character of the Child. John is a dreamy inattentive child. He is very quiet and unassuming. It is only by constantly watching him that anything can be accomplished. He can sit watching a person with an absolutely rapt look on his face, and not know one thing that has been said. This inattentiveness, I believe, is a health problem, as he shows symptoms of mal-nutrition and lack of proper food and care.

He has not the vitality and strength to join in rugged out-door games, and get any real enjoyment from them. He enjoys himself more when he can work quietly alone on some piece of carpentering. Although these projects are often unsuccessful, he seems not to mind. These articles that are built, show very little skill or ingenuity. They are awkward and unstable pieces, but he seems to enjoy building them more for the activity, than the result.

As his reading was poor, he did not enjoy books as much as most children of his age. The adventure books, so popular with boys, did not interest him. When he did read, which was

fourth grade teacher's part, he was promoted to grade five after spending five months in the fourth grade.

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As his reading was poor, he did not enjoy books as much as most children of his age. The adventure books, so popular with boys, did not interest him. When he did read, which was

very seldom, his selection was amazingly immature, such as Thornton Burgess series of animal books. He also read Bunny Brown and his Sister Sue. These seemed to be the types of reading he could get the most enjoyment from.

Home. John is the oldest of five children, three of whom are in school. They live in a modest, attractive, single house and are considered to be in moderate circumstances.

The mother is very motherly type of person and quite patient with children, but very ineffective and utterly lacking in force. John is an exact replica of his mother. The mother could not understand reports from school about John's inattentiveness because he was so good at home. As far as that went, his conduct in school was perfect. It was his lack of attention that was causing trouble. She finally admitted that he had to be spoked to frequently in order to get anything done.

John's father has been working part time for the last two years, but when unemployed, always finds something around the house to keep him busy. John's grand parents also make their home with the family.

Since the depression, a relations family, consisting of mother, father, and two young children are staying at the house. This makes the house crowded and constantly noisy, so I have come to the conclusion that John enjoys the comparative quietness and peace of the school room. He is content to enjoy it without any attempt at work.

very seldom, his selection was usually immature, such as
Thornton Burgess series of animal books. He also read
Bunny Brown and his Sister Sue. These seemed to be the types
of reading he could get the most enjoyment from.
Home. John is the oldest of five children, three of
whom are in school. They live in a modest, attractive, single
house and are considered to be in moderate circumstances.
The mother is very motherly type of person and quite
patient with children, but very ineffective and utterly lack-
ing in force. John is an exact replica of his mother. The
mother could not understand reports from school about John's
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enjoy it without any attempt at work.

Cause of Failure. John's trouble started in the first grade. He was so inattentive that he lost a great deal of the work. This might have been overcome but his attention was not captured and sustained. It was not until the end of the third grade that he was far enough behind his class to warrant non-promotion. No other adjustment was possible in the school system.

His third grade difficulties were rectified to some extent, by summer school, but never entirely cleared up. Before entering grade four he could add, subtract, and multiply with a one number multiplier if supervised closely enough so his attention did not wander.

In the fourth grade only the minimum essentials were attempted because of the limited time he was in the grade (5 months). It is doubtful, in the light of present conditions, if these essentials were thoroughly achieved.

Failure to know long division, decimals, and fractions could not prevent promotion to the sixth grade.

One teacher described the boy by saying one would need a three ring circus to keep his attention, and this is not much of an exaggeration. He is so quiet and seemingly attentive that one forgets his trick and learns when testing how little has been absorbed, because that is what it consists of, a passive process. It is practically impossible to arouse him to any kind of activity. His conduct mark is always A and his application D.

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Procedure. The first step to be taken was to build up the boy's health and increase his resistance to common colds. The school nurse visited the family and explained that John was physically handicapped by his being so much underweight. If his health were built up his school work would no doubt be improved. This health handicap could not be understood by the mother because they always have a very fine garden and all summer there were plenty of fresh vegetables. On further discussing the point, she admitted that John practically refused to touch vegetables. Also none of the surplus from the garden was preserved for winter use. Since John would not eat what was good for him she permitted him to eat what he wanted so he would not go to school hungry.

The school provided milk for the child every morning, but he did not like milk and rather than annoy himself explaining this to me, simplified matters to his own satisfaction by giving it away to another youngster at the first possible moment.

The school nurse made arrangements for the child to go to a clinic for a thorough physical test, but the mother never kept the appointment. It seems that false pride forbade them to accept help no matter how readily and cheerfully given or how badly needed. They would rather suffer than accept outside help.

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Since very little could seemingly be done physically for the child, I tried to let him feel success in class work. However, it was almost impossible.

He did not have enough desire or vitality to cooperate successfully. The children in the room are of a very competitive nature and either the work had to be so very easy that most all of the class received perfect papers or John had to be given different work, easier than the rest of the class. His class mates liked the child, but he never shone in school and when success was attained through the plan used, they very soon told him that his work was easier than theirs.

It was decided that if John were to stay in the room doing his regular arithmetic class work, the remedial work on the four fundamental processes could be worked on outside of school hours and in this way the necessary constant supervision could be given. Once the fundamentals were on a firm basis the sixth grade written work could be omitted, the time being spent with the fifth grade arithmetic class for the introduction and necessary drill of fractions and decimals. This proved a very satisfactory arrangement. John needed the constant supervision that could be given by this plan.

His mother indicated her willingness to help him at home by drilling him on the fundamental facts by means of flash cards. She corrected his examples but was not permitted to help him on them. If he was unable to get examples correctly after sufficient time had been spent they were brought back and re-explained in school. In this way the process method was controlled and only one method for doing work was given, thus forestalling confusion.

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Remedial Work. John's remedial work began in the middle of October with the Wilson Inventory and Diagnostic tests in addition (1). As much time had been spent in the third grade and summer school on the fundamental processes, the results on these tests were nearly satisfactory.

3A 100%

3B 100%

3C 98%

3D 92%

In test 3C, two facts, $\frac{36}{47}$ $\frac{29}{32}$ were unknown

In test 3D, seven	36	29	28	35	29	33	39
facts were unknown	$\frac{7}{42}$	$\frac{9}{37}$	$\frac{9}{38}$	$\frac{8}{42}$	$\frac{7}{38}$	$\frac{9}{41}$	$\frac{6}{47}$

It can be readily seen that these mistakes were very often caused by 9's or 7's. These 9 and 7 facts were placed on flash cards and very readily drilled out.

The next day, the Wilson Process Inventory and Diagnostic test (2) 3P in addition was given with the penalty score 90, The percent of problems correct was 98%. Two errors in the tenth group, $42 + 3 + 4 + 5 + 2 + 7 = 62$ and $40 + 5 + 4 + 4 = 54$, caused difficulty. I believe this was due to John's trouble in attention. It was difficult to keep the decade and proper digit in mind.

(1) Wilson Inventory and Diagnostic test in Arith. op. cit.

(2) Wilson Process Inventory and Diagnostic test in Arith. Op. cit.

- (1) Wilson Process Inventory and Diagnostic test in Arith. op. etc.
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 $40 + 5 + 4 + 4 = 54$, caused difficulty. I believe this was
 tenth group, $42 + 8 + 4 + 5 + 7 = 66$ and

The percent of problems correct was 98%. Two errors in the

test (2) 3P in addition was given with the penalty score 30.

The next day, the Wilson Process Inventory and Diagnostic

flash cards and very readily drilled out.

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It can be readily seen that these mistakes were very often

42	37	38	43	38	7	8	33	38
43	37	38	43	38	7	8	33	38
43	37	38	43	38	7	8	33	38

In test 3D, seven
 facts were unknown

$$\frac{4}{47} \frac{7}{32}$$

In test 3C, two facts, 35 39 were unknown

3D	93%
3C	98%
3B	100%
3A	100%

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 of October with the Wilson Inventory and Diagnostic tests in
Remedial Work. John's remedial work began in the middle

Results in Addition Tests

1. Wilson Inventory and Diagnostic Test in Addition

Date	Test	Score
10/15/32	3A	100%
10/15/32	3B	100%
10/16/32	3C	98%
10/16/32	3D	92%

2. Wilson Process Inventory and Diagnostic test in Addition

Date	Test	Score	Penalty Score
10/17/32	3P	98	90

In subtraction, the facts as well as the method was known. The Wilson Inventory and Diagnostic tests showed results of:

Test	Score
4A	100%
4B	99%
4C	95%

The following errors, $24 - 18 = 4$, $62 - 56 = 8$, $31 - 27 = 5$, $61 - 54 = 8$, $55 - 8 = 6$, were drilled out by means of flash cards.

The Wilson Process Inventory test (2) in subtraction showed 100% results.

- (1) Wilson Inventory and Diagnostic tests in Arith. op. cit.
 (2) Wilson Process Inventory and Diagnostic Test in Arith. Op. cit.

Results in Addition Tests

1. Wilson Inventory and Diagnostic Test in Addition

Score	Test	Date
100%	3A	10/15/32
100%	3B	10/15/32
98%	3C	10/18/32
98%	3D	10/18/32

2. Wilson Process Inventory and Diagnostic test in Addition

Penalty Score	Score	Test	Date
90	98	3P	10/17/32

In subtraction, the facts as well as the method was known. The Wilson Inventory and Diagnostic tests showed re-

Score	Test	Results of:
100%	4A	
98%	4B	
98%	4C	

The following errors, 34 - 18 = 4, 62 - 58 = 4, 31 - 27 = 4, 61 - 54 = 7, 55 - 8 = 6, were drilled out by means of flash cards.

The Wilson Process Inventory test (2) in subtraction showed 100% results.

(1) Wilson Inventory and Diagnostic tests in Arith. on. etc.

(2) Wilson Process Inventory and Diagnostic Test in Arith. Op. etc.

Result in Subtraction Tests

1. Wilson Inventory and Diagnostic Tests in Subtraction (1)

Date	Test	Score
10/18/32	4A	100%
10/18/32	4B	99%
10/18/32	4C	95%

2. Wilson Process Inventory and Diagnostic Tests in Subtraction (2)

Date	Test	Score	Penalty Score
10/19/32	4P	100%	100%

John had not always received perfect marks in addition and subtraction work because of his difficulty in concentration. He knew the facts but he was unable to keep his mind on his job long enough.

In multiplication, the flash cards revealed that not all the facts were known although the tables could be repeated very rapidly. The facts were drilled on by flash cards before the Wilson Process Inventory and Diagnostic test in multiplication was given, with its resultant percent of 78, penalty score 70.

It was found that John could do multiplication with one figure multipliers, but two or three place multipliers, involving single or double zeros in the multiplicand or multiplier, caused trouble:

506	68	435	54	840	842
<u>129</u>	<u>40</u>	<u>308</u>	<u>270</u>	<u>690</u>	<u>2100</u>
4554	000		000		
512	<u>272</u>		378		
<u>506</u>	<u>272</u>		<u>108</u>		

(1) Wilson Inventory and Diagnostic tests in Arith. op. cit.

(2) Wilson Process Inventory and Diagnostic Tests in Arith. op. cit.

Result in Subtraction Tests

1. Wilson Process Inventory and Diagnostic Tests in Subtraction (1)

Score	Test	Date
100%	4A	10/18/38
95%	4B	10/18/38
95%	4C	10/18/38

2. Wilson Process Inventory and Diagnostic Tests in Subtraction (2)

Penalty Score	Score	Test	Date
100%	100%	4P	10/18/38

John had not always received perfect marks in addition and subtraction work because of his difficulty in concentration. He knew the facts but he was unable to keep his mind on his

job long enough.

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plier, caused trouble:

808	435	54	840	843
128	308	270	890	2100
4564	000	000		
512	378	378		
308	378	108		

(1) Wilson Process Inventory and Diagnostic Tests in Arithmetic

(2) Wilson Process Inventory and Diagnostic Tests in Arithmetic

These zero difficulties were readily explained and drill for over 2 weeks was continued on them. It is probable that some of this drill could have been omitted, but in view of John's very careless work methods, it was included.

Result of Multiplication Tests

1. Wilson Process Inventory and Diagnostic Test in Multiplication.

Date	Test	Score	Penalty Score
11/5/32	5P	78%	70

John's real trouble was long division. The work had already been introduced and explained when he entered the fourth grade. He missed the set plan of procedure that was drilled in step by step, so the teaching procedure including the transitional step from one figure divisors, to two or more figure divisors, was inadequately reviewed.

When I began work with John, the fact that he knew anything about the process was ignored, and the work taken back at the beginning. In this way a firm background would be built up without any previous errors in process having to be drilled out. The reverse multiplication facts: $9 \times ? = 36$, $36 \div ? = 9$, $? \times 8 = 72$, etc., were drilled on at home by means of flash cards. Then uneven division facts were learned. Division with one figure divisors was done exclusively by the long division method so as to make this an almost automatic process. In three weeks time the Wilson Process Inventory and Diagnostic test in short division was administered with the

These rare difficulties were readily explained and drilled for over 2 weeks was continued on them. It is probable that some of this drill could have been omitted, but in view of John's very careless work methods, it was included.

Result of Multiplication Tests

1. Wilson Process Inventory and Diagnostic Test in Multiplication.

Date	Test	Score	Penalty Score
11/5/38	SP	78 1/2	70

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When I began work with John, the fact that he knew anything about the process was ignored, and the work taken back at the beginning. In this way a firm background would be built up without any previous errors in process having to be drilled out. The reverse multiplication facts: $9 \times 7 = 36$, $36 \div 7 = 9$, $7 \times 8 = 56$, etc., were drilled on at home by means of flash cards. Then uneven division facts were learned. Division with one figure divisors was done exclusively by the long division method so as to make this an almost automatic process. In three weeks time the Wilson Process Inventory and Diagnostic test in short division was administered with the

resulting score of 100%. This pleased the child and gave new impetus to the long division work.

Two figured divisors were introduced by 10's, 11's and 12's. The step was made from here to 21's, 32's, etc. No new difficulties were given until a complete explanation had been given John. The work itself took more than five weeks but the results show it was well worth the time. John came in early before school every morning and noon, and worked problems on the board. All examples were required to be proved thus giving multiplication as well as division drill. John was unable to complete as many problems as the ordinary child because of his slowness, but it was perfection that was being sought, rather than speed. I doubt if anyone or anything could have induced a burst of speed from John.

The Wilson Process Inventory and Diagnostic test, 6P, in (1) division, showed John to be 98% perfect in long division. An error in the ninth group caused by carelessness rather than ignorance gave a penalty score of 90.

Results of Division Tests

1. Wilson Process Inventory and Diagnostic tests in Division

Date	Test	Score	Penalty Score
11/26/32	6P ₁	100%	100
1/8/33	6P ₂	98%	90

resulting score of 100%. This pleased the child and gave new impetus to the long division work.

Two figured divisors were introduced by 10's, 11's and 12's. The step was made from here to 21's, 22's, etc. No new difficulties were given until a complete explanation had been given John. The work itself took more than five weeks but the results show it was well worth the time. John came in early before school every morning and noon, and worked problems on the board. All examples were required to be proved thus giving multiplication as well as division drill. John was unable to complete as many problems as the ordinary child because of his slowness, but it was perfection that was being sought, rather than speed. I doubt if anyone or anything could have induced a burst of speed from John.

The Wilson Process Inventory and Diagnostic test, BP, in (1) division, showed John to be 98% perfect in long division. An error in the ninth group caused by carelessness rather than ignorance gave a penalty score of 90.

Results of Division Tests

1. Wilson Process Inventory and Diagnostic tests in Division

Date	Test	Score	Penalty Score
11/25/32	BP	100%	100
1/8/33	BP	98%	90

Now that the fundamental processes had been checked for accuracy, John was ready to begin work in fractions and decimals. It is to be remembered that John was, all this time, doing the regular sixth grade work with his class. Now he attended the fifth as well as the sixth grade arithmetic period, by omitting sixth grade written work until after school nights. In this way he was able to again obtain the preliminary explanations and drills for both fractions and decimals.

	10/16/32	32	175 Grade combinations as needed for multiplication for carrying to 2 x 2	99	
2.	10/17/32	32	Addition Process	99	90
3.	10/18/32	42	55 single operations no borrowing	100	
	10/19/32	42	45 combinations requiring borrowing	99	
	10/19/32	40	200 of 311 subtractions with remainders as needed for short division	95	
4.	10/19/32	42	Subtraction Process	100	100
5.	11/5/32	52	Multiplication Process	75	70
6.	11/26/32	52	Short Division Process	100	100
	1/2/33	52	Long Division Process	95	90
7.	2/15/33 Form H		Survey Test	130	(possible score 135)

Now that the fundamental processes had been checked for accuracy, John was ready to begin work in fractions and decimals. It is to be remembered that John was, at this time, doing the regular sixth grade work with his class. Now he attended the fifth as well as the sixth grade arithmetic period, by omitting sixth grade written work until after school nights. In this way he was able to again obtain the preliminary explanations and drills for both fractions and decimals.

Summary Record of Tests and Results

Wilson Tests Used as Previously Noted

	Date	Test	Score	Penalty Score
1.	10/15/32	3A Easier Primary addition Facts	100	
	10/15/32	3B Difficult and zero combinations	100	
	10/16/32	3C 300 Decade combinations to $39 + 9$	98	
	10/16/32	3D 175 Decade combinations as needed for multiplication for carrying to 9×9	92	
2.	10/17/32	3P Addition Process	98	90
3.	10/18/32	4A 55 simple operations no borrowing	100	
	10/18/32	4B 45 combinations requiring borrowing	99	
	10/18/32	4C 200 of 211 subtractions with remainders as needed for short division	95	
4.	10/19/32	4P Subtraction Process	100	100
5.	11/5/32	5P Multiplication Process	78	70
6.	11/26/32	6P Short Division Process	100	100
	1/8/33	6P _u Long Division Process	98	90
7.	5/15/33	Form 2 Survey Test	120 (possible score 125)	

Summary Record of Tests and Results
Wilson Tests Used as previously noted

No.	Date	Test	Score	Penalty Score
1.	10/15/33	3A Easier Primary addition Facts	100	
	10/15/33	3B Difficult and zero combinations	100	
	10/15/33	3C 300 Decade combinations from 28 + 2	98	
	10/15/33	3D 175 Decade combinations as needed for multiplication for carrying to 9 x 9	92	
2.	10/17/33	3P Addition Process	98	80
3.	10/18/33	4A 55 simple operations no borrowing	100	
	10/18/33	4B 45 combinations re-during borrowing	98	
	10/18/33	4C 300 of 211 combinations with remainders as needed for short division	92	
4.	10/19/33	4P Subtraction Process	100	100
5.	11/5/33	5P Multiplication Process	78	70
6.	11/26/33	6P Short Division Process	100	100
	1/8/33	6P Long Division Process	98	90
7.	5/15/33 Form 2 Survey Test		120 (possible score 125)	

Summary of Case 2.

John's trouble was as much physical as it was mechanical. He seemingly could not focus and retain his attention on a set thing long enough to grasp and master it. He had very poor power of concentration. Having failed before in arithmetic and been promoted, it did not at all worry or disturb him during September and October to find himself failing again. He could not seem to be aroused from his inertia long enough to become disturbed about his school standing. D.D.?

His home was not a restful spot. There always seemed to be noise and confusion present but nothing could be done about that.

His health was badly in need of attention but though opportunity was given to obtain a diagnosis of this trouble, it was not accepted by the family.

John's remedial work on the four fundamentals began in October and continued until the middle of January. Of course, practically all remedial work was done in multiplication and division, the other two processes having been found satisfactory.

The work for John was very difficult to motivate. He belonged to no organized group or club and had no desire to join one. Due to difficulty in the mechanics of reading, he did not enjoy books. He had no real vital interest in games, and would play in a half-hearted way that annoyed the other boys.

He did some very crude work with tools and it was through

Summary of Case 3.

John's trouble was as much physical as it was mechanical. He seemingly could not focus and retain his attention on a set thing long enough to grasp and master it. He had very poor power of concentration. Having failed before in arithmetic and been promoted, it did not at all worry or disturb him during September and October to find himself failing again. He could not seem to be aroused from his inertia long enough to become disturbed about his school standing.

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The work for John was very difficult to motivate. He belonged to no organized group or club and had no desire to join one. Due to difficulty in the mechanics of reading, he did not enjoy books. He had no real vital interest in games, and would play in a half-hearted way that annoyed the other boys. He did some very crude work with tools and it was through

this that he was able to be partially reached. It was suggested that he join in competition with a group of boys in building an airplane model. As he had never seen an airplane at close range, a trip was made to the airport for first hand information. While here he heard so much talk of time, distance, and power, that he realized the importance of arithmetic, but, sad to relate, it stirred no burning desire in his breast for furtherance of his own knowledge.

No objections or refusal to the remedial work were made, the same lack of enthusiasm being shown in this as in everything else--perfect pacifism. The work was done and done thoroughly but this was due to an outside force rather than something within the child.

John mastered the fundamentals of arithmetic. His mark on the Wilson General Survey Test, Form 2, along with the amount of drill work completed, gives conclusive proof of this. In the survey test, he succeeded in doing 120 out of the 125 problems.

Although by May, John had been brought up to the standard of his class in arithmetic, his average in other subjects was very unsatisfactory. Reading, History and Geography were so very poor that it was decided that the best thing for the child would be to repeat the grade.

The failure cannot be truthfully claimed as John's fault. His physical handicap was so great that it was taking its toll on his vitality and causing lack of ability and interest in his

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No objections or refusal to the remedial work were made, the same lack of enthusiasm being shown in this as in everything else--perfect pacifism. The work was done and done thoroughly but this was due to an outside force rather than something within the child.

John mastered the fundamentals of arithmetic. His mark on the Wilson General Survey Test, Form S, along with the amount of drill work completed, gives conclusive proof of this. In the survey test, he succeeded in doing 150 out of the 155 problems.

Although by May, John had been brought up to the standard of his class in arithmetic, his average in other subjects was very unsatisfactory. Reading, History and Geography were so very poor that it was decided that the best thing for the child would be to repeat the grade.

The failure cannot be truthfully claimed as John's fault. His physical handicap was so great that it was taking its toll on his vitality and causing lack of activity and interest in his

work. This was unfortunate and inexcusable but nothing could be done about it.

His mother, after spending so much time on his arithmetic, was very disappointed. After much discussion and persuasion (thru the Superintendent's office) the child was sent to the seventh grade. Here he was put with children of very low intelligence. They were not expected to complete the regular seventh grade requirements because of their mentality. In this group John's work was considered adequate. This was the first adjustment offered by the school, but it is doubtful if it is the right adjustment.

It was of course something for the school to make any adjustment for John. The particular adjustment made may not be the best, but if the teachers and all concerned can show professional attitudes, we may expect that John will be properly taken care of.

Just how delicate her health was, no one realized until February of 1933. She seems to be "left out" with the rest of the class. She would like to be a part of the group, but just does not fit.

She is very tall for her age, 5' 8", and is over 15 pounds underweight. She is awkward and is not readily chosen in games although she plainly shows she would like to be. She tries hard enough to be acceptable but she has never learned how to play with other children her own age. This, no doubt, is due to the fact that she is more self-conscious of her size than the average child. Again she has never lived long enough in one place

work. This was unfortunate and inconceivable but nothing could be done about it.

His mother, after spending so much time on his arithmetic, was very disappointed. After much discussion and persuasion (thru the Superintendent's office) the child was sent to the seventh grade. Here he was put with children of very low intelligence. They were not expected to complete the regular seventh grade requirements because of their mentality. In this group John's work was considered adequate. This was the first adjustment offered by the school, but it is doubtful if it is the right adjustment.

It was of course something for the school to make any adjustment for John. The particular adjustment made may not be the best, but if the teachers and all concerned can show professional attitudes, we may expect that John will be properly taken care of.

IV. Case 3. Evelyn

The following is significant data on Case 3. It was obtained from the Dearborn Group Intelligence Test, given in May, 1932.

(1) CA 12-2

MA 13-0

IQ 107

School History. Evelyn had been having a great deal of trouble in arithmetic throughout the school grades. Her reading and spelling were also poor.

Evelyn started school at the age of six, but due to changing schools from one state to another (Mass. to Conn. to Mass. to Maryland to Mass.) lost a great deal of the necessary fundamental drill in these three subjects.

Character of the Child. Evelyn is a quiet delicate child. Just how delicate her health was, no one realized until February of 1933. She seems to be "left out" with the rest of the class. She would like to be a part of the group, but just does not fit.

She is very tall for her age, 5' 6", and is over 15 pounds underweight. She is awkward and is not readily chosen in games, although she plainly shows she would like to be. She tries hard enough to be sociable but she has never learned how to play with other children her own age. This, no doubt, is due to the fact that she is more self-conscious of her size than the average child. Again she has never lived long enough in one place

(1) McCall. How to Experiment op. cit.

IV. Case 3. Evelyn

The following is significant data on Case 3. It was obtained from the Dearborn Group Intelligence Test, given in May, 1933.

(1) CA 13-3

MA 13-0

IQ 107

School History. Evelyn had been having a great deal of trouble in arithmetic throughout the school grades. Her reading and spelling were also poor.

Evelyn started school at the age of six, but due to changing schools from one state to another (Mass. to Conn. to Mass. to Maryland to Mass.) lost a great deal of the necessary fundamental drill in these three subjects.

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to become thoroughly acquainted with other children.

Home. Evelyn is the only child of rather indulgent parents. Her father and mother are much older than the average parents of children in the room. While they would give the child any material thing within reason that she wants, they are not affectionate people. The girl seems starved for affection and tries to satisfy this longing by means of silent "crushes" on other members of the class.

Evelyn is allowed very little time in which to do as she wishes. She is taking violin lessons and doing very well on this instrument. This success, I believe, is due more to perseverance than to actual talent. She said, "I don't mind practicing". "I have nothing else to do".

Evelyn's father is a salesman and judging from the material advantages he is able to give the child, he is doing very well. The mother is a very delicate, nervous person that is frequently ill and in consequence, irritable. The outside activities and contacts of the family are rather limited.

Cause of Failure. Evelyn's school records from the last part of the fourth grade are available and her arithmetic trouble had started before that time. In February, 1930, Evelyn moved from Maryland and was put back into the fourth grade instead of being allowed to remain in the fifth grade. She was non-promoted that year and remained in the fourth grade until the following January. In this fourth grade room she was two years older than the other children, hence, the work in most subjects

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following January. In this fourth grade room she was two years
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was much more easily accomplished by her. In view of this fact, it was felt that she would be better adjusted with older children, although her arithmetic was still unsatisfactory, so she was transferred to the fifth grade. When she entered this room, most all the work in fractions had been covered and decimals were about to be introduced. This gave her an additional burden to carry in arithmetic. She not only had to start decimals on a very inadequate foundation, but do make-up work in fractions. Due to her nervous temperament, work progressed very slowly. The fractions did not receive all the attention necessary for mastery and the decimals especially multiplication and division, were insecure in her mind. However, in June, after spending six months in the present grade V, she was promoted to grade VI. It is to be borne in mind that she entered the present school after completing all of grade IV and half of grade V. She was demoted to grade IV again and remained there one year, then went on to grade V making a total of two years in grade IV and one year in grade V.

Procedure. Evelyn would be happier if she were allowed to do her regular work with class and receive remedial help outside of school. She spent so little time with children her own age that it seemed a wise plan to allow her to retain this opportunity for association with them. Her regular arithmetic period each day was devoted to sixth grade work until after the four fundamental processes had been mastered. Then just the oral part of the period was utilized for sixth grade work, the

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written time being spent with the fifth grade for the necessary work on fractions and decimals. During this time the written work of the two classes was done after school or in free time during the day.

Evelyn's parents were anxious to help her at home, but were asked to confine this help to drill and correcting work, rather than to the explanations of process difficulties.

Remedial Work. As the girl had mastered the addition and subtraction processes, as was clearly shown by the Wilson Inventory and Diagnostic tests in those two processes, work was immediately begun on multiplication.

The multiplication facts were known in table form. These were broken up by means of flash cards, various forms later helpful in division, being used: $8 \times ? = 32$, $36 = 9 \times ?$, $\frac{42}{7} = ?$. The Wilson Process Inventory and Diagnostic test in multiplication with its score of 66 showed such errors as :

506	68	924	80	230
129	40	906	17	23
4554	272	5544	560	690
102		8316	80	460
506				

These errors were caused by zeros and the misplacement of the partial product. This type of error was drilled out by three weeks of work both after school and at home.

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The multiplication facts were known in table form. These were broken up by means of flash cards, various forms later helped in division, being used: $8 \times 9 = 72$, $72 \div 8 = 9$, $72 \div 9 = 8$. The Wilson Process Inventory and Diagnostic test in multiplication with the score of 68 showed such errors as:

508	68	924	80	230
129	40	908	17	23
4554	372	5544	580	880
102		8316	80	480
505				

These errors were caused by zeros and the misplacement of the partial product. This type of error was drilled out by three weeks of work both after school and at home.

Results in Addition Tests

(Wilson Tests Used as Previously Noted)

	Date	Test	Score	Penalty Score
1.	10/31/32	3P	100	100
2.	11/1/32	3A	100	
	11/1/32	3B	100	
	11/2/32	3C	100	
	11/2/32	3D	100	

Results in Subtraction Tests

	Date	Test	Score	Penalty Score
3.	11/3/32	4A	100	
	11/3/32	4B	100	
	11/4/32	4C	99	
	11/5/32	4P	98	90

Result in Multiplication Test

	Date	Test	Score	Penalty Score
1.	11/15/32	5P	66	40

Results in Addition Tests
(Wilson Tests Used as Previously Noted)

Date	Test	Score	Penalty Score
1. 10/31/32	3P	100	100
2. 11/1/32	3A	100	
11/1/32	3B	100	
11/2/32	3C	100	
11/3/32	3D	100	

Results in Subtraction Tests

Date	Test	Score	Penalty Score
3. 11/3/32	4A	100	
11/3/32	4B	100	
11/4/32	4C	99	
11/5/32	4P	98	90

Result in Multiplication Test

Date	Test	Score	Penalty Score
11/15/32	5P	98	40

The short division method was not thoroughly known. The Wilson Process Inventory and Diagnostic test, 6P, with its score of 58, revealed errors caused by zeros or remainders.

$$\begin{array}{r} 13/ \\ 7 \overline{)3} \end{array} \quad \begin{array}{r} 31 \\ 7 \overline{)2107} \end{array} \quad \begin{array}{r} 30 \quad 7/5 \\ 5 \overline{)152} \end{array} \quad \begin{array}{r} 14 \\ 4 \overline{)4016} \end{array} \quad \begin{array}{r} 23 \\ 8 \overline{)182} \end{array}$$

These errors were remedied by having short division problems done according to the long division method, as was done with the child in Case 2. All one figure divisors were divided by the long division method. This was to firmly establish the procedure and avoid process mistakes when two figure numbers were used. 10's, 11's, 12's formed the transitional link between the one figure divisors and the two. No new difficulties were given until after complete explanation had been made. All examples required proof. This drilled multiplication more completely.

The Wilson Process Inventory and Diagnostic test in long division, after six weeks of work, showed a score of 96%

Result of Division Tests

	Date	Test	Score	Penalty Score
1.	12/7/32	6P ₁	58	40
	1/19/33	6P ₂	96	90

The short division method was not thoroughly known. The Wilson Process Inventory and Diagnostic test, GP, with the score of 58, revealed errors caused by zeros or remainders.

$$\begin{array}{r} 7 \overline{) 18} \\ 14 \\ \underline{40} \\ 80 \\ \underline{80} \\ 00 \end{array}$$

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The Wilson Process Inventory and Diagnostic test in long division, after six weeks of work, showed a score of 98.

Result of Division Tests

Date	Test	Score	Penalty Score
1. 12/7/32	GP	58	40
1/12/33	GP	98	90

Summary Record of Tests and Results

Wilson Tests Used as Previously Noted

	Date	Test	Score	Penalty Score
1.	10/31/32	3P Addition Process	100	100
2.	11/1/32	3A Easier Primary addition facts	100	
	11/1/32	3B Difficult and zero combinations	100	
	11/2/32	3C 300 Decade combinations to $39 + 9$	100	
	11/2/32	3D 175 Decade combinations as needed for carrying in multiplication to 9×9	100	
3.	11/3/32	4A 55 simple operations no borrowing	100	
	11/3/32	4B 45 combinations requiring borrowing	100	
	11/4/32	4C 200 of 211 subtractions with remainders as needed for short division	99	
4.	11/5/32	4P Subtraction Process	98	90
5.	11/15/32	5P Multiplication Process	66	40
6.	12/7/32	6P Short Division Process	58	40
	1/19/33	6P ₂ Long Division Process	96	90
7.	5/15/33	Form 2 not given		

Summary Record of Tests and Results
 Wilson Tests Used as Previously Noted

Date	Test	Score	Penalty Score
1. 10/31/32	3P Addition Process	100	100
2. 11/1/32	3A Easter Primary addition tests	100	
11/1/32	3B Difficult and zero combinations	100	
11/2/32	3C 300 Decade combinations to 32 + 9	100	
11/2/32	3D 175 Decade combinations as needed for carrying in addition - 2 x 9	100	
3. 11/5/32	4A 55 simple operations no borrowing	100	
11/5/32	4B 45 combinations requiring borrowing	100	
11/4/32	4C 300 of 211 operations with remainders as needed for short division	98	
4. 11/5/32	4P Subtraction Process	98	90
5. 11/15/32	5P Multiplication Process	98	40
6. 12/7/32	6P Short Division Process	98	40
1/19/33	6P Long Division Process	98	90
7. 2/15/33	Form 2 not given		

Summary of Case 3. It was not because Evelyn was unfamiliar with the facts that she failed, but rather that she was never quite sure of the processes involved. She learned the facts herself, but the processes and methods of presentation used by the various school systems, puzzled her.

The school systems themselves failed, rather than Evelyn, because they did not provide for her arithmetic needs. What one system required for entrance to grade V, another did not think adequate to even attain success in grade IV.

Standards in school systems vary as do individuals in the system. Evelyn's trouble started, undoubtedly, by her lack of ability to quickly adjust herself satisfactorily to the varying standards and methods she encountered. She was not an assertive child, and as is usually the case, youngsters that are not troublesome are often neglected because of their very natures.

Evelyn's progress during the remedial work was very satisfactory. While her division work required most of the time, errors, though slight in the other three processes, were rectified.

The middle of January she joined the fifth grade class for work in fractions and decimals, but an unforeseen occurrence necessitated a discontinuance of school. While out sick with a cold, the Doctor discovered Evelyn had a very serious heart condition. He advocated a complete rest in bed for a year to give the heart time to rest. The child was working far beyond

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her strength. She was put to bed and not allowed any form of exertion. Even books were forbidden. It was some time more than a year before she was up out of bed again.

In May, 1934, after more than a year's absence, Evelyn came to visit. I was more than interested to see the condition of her arithmetic. I gave her a drill page of thirty problems in the four fundamental processes and she received a mark of 87%. Four errors this time instead of being due to process difficulties, were caused by careless mistakes such as $1 \times 4 = 5$.

Of course, this is not conclusive proof that the girl is now perfect in arithmetic, but it does show she is at least headed in the right direction.

This summer, while at the beach, a tutor has been engaged to review Evelyn on sixth grade work in an attempt to promote her to Junior High School. Frankly, I believe this will be too much of a strain on her. In order for her to pass the entrance examination she will not only have to review the part of the sixth grade work that she had, but be taught fractions and decimals as well as a great deal of material in percentage that she missed.

Since her other school subjects, such as Geography, History and English Grammar, will be deficient, I believe the best plan would be to repeat the sixth grade. In this way her difficulties will be straightened out without putting too great a strain on her strength.

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V. Case 4. Norman

The only exact data we have pertaining to Norman's case is his IQ from a Dearborn Group Test. His intelligence quotient is 93.

School History. Norman is a slow child in school. He needs much individual attention, especially where any abstract reasoning is involved. Norman's arithmetic trouble in school did not start until the middle of the fourth grade. However, he had repeated the second grade because of the slow progress he made in reading. During the fourth grade, arithmetic trouble became very evident which resulted in failure in arithmetic. The fifth grade work was again successful except for the arithmetic. True, the other marks were of a low quality, but still sufficient for promotion. As attendance in school had been fairly regular and the intelligence low normal, there was no real necessary reason for this arithmetic failure.

Character of the child. Norman is an extremely active child, interested in everything in the world around him. He is very good at sports and enjoys himself on every occasion. He is willing to work and will work hard at concrete tasks, but in abstract matters often fails to grasp the point. Human beings and the world around him hold his interest and he will hunt around and find out human interest facts for himself. He is always trying to interest other boys in his pastimes. He is well liked in school and is a leader on the playground. He is a good organizer and very practical. He is very earnest in

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is well liked in school and is a leader on the playground. He

is a good organizer and very practical. He is very earnest in

school and does want a good report card. He is, in short, what one thinks of when the term, "normal boy", is used.

Home Conditions. Norman's father is a business man, owning a very large motor repair shop. His mother is a very energetic person, like Norman, vitally interested in the world about her. There is a small sister, age 4, that Norman is very fond of. Every encouragement is given the boy at home. He is a real participating member of the family, and allowed to enter into discussions. He and his father, on the average of once a week, go to a hockey game or boxing match, so that Norman has many interests outside of school. He has a very firm feeling of security in the family.

Cause of Failure. Norman is very slow in arithmetic. He must take new subject matter very slowly and go over it a great many times before he is really sure of the method. He is eager to learn and very patient but it does take him a long time to memorize and learn facts. It is probable, although we have no data to substantiate this, that in the fourth grade, he was absent when long division was introduced. This absence might have been only for a short time, but it was sufficient to handicap him greatly. Although the process might have been explained later, there was not sufficient drill provided to instill the method deeply in his mind. While he struggled with the method, it became apparent from his errors that he was not sure of all the division tables--that is the reverse of the multiplication tables. True he could say them in order

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but it was a parrot-like performance.

Although he was not perfect in fractions, he, no doubt, would have been passed in arithmetic in grade V had it not been for division of decimals. It was not difficult to straighten him out because of his eagerness to succeed and his remarkable amount of perseverance. Failures that would have discouraged an ordinary child, seemed to spur him on.

Method of Procedure. Norman is very much interested in the Boy Scouts and is very proud of the fact that he has been so successful in passing the tests. He has been ashamed of the showing he has made in arithmetic and really wanted to improve. When he was shown how really few errors were causing his failure, he decided he was smart enough to conquer them. It was decided that it would be best if he took no work with the class until we were sure that the work in the four fundamental processes taught in the previous grades, were thoroughly known. Norman worked by himself in a small room off the regular class room and we checked every night. This method proved most satisfactory with this child. Norman, as has been already explained, needed much drill because of his poor memory. Both the visual and audible methods of memorizing drill material, were tried and it was found that he retained facts much more satisfactorily if they were repeated out loud, hence, he was permitted to work alone.

Norman was excused from arithmetic for a month, during which time the sixth grade had been having drill on fractions

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Norman was excused from arithmetic for a month, during

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and decimals, two phases of arithmetic Norman needed very badly. When he returned to his regular class at the end of the month, no new sixth grade work had been introduced. However, the fifth grade were just beginning fractions and Norman attended oral arithmetic with this class as well as the sixth grade. No written work in either fifth or sixth grade work was done in school session, but Norman came in at 12:50 every day and worked until 1:20 on the sixth grade written problems. In that way he was able to devote as much time to written work as the sixth grade and was also able to obtain the benefit of necessary fifth grade work. The fifth grade written work was done at spare moments during the day and finished after school at night. It must be remembered that Norman had already been introduced to fractions but this fact was ignored so as to give a firm foundation. Of course, the written work was much easier for him than for the average fifth grader, but then he had less time to spend on it. This same procedure was followed out for decimals. Norman joined both arithmetic classes for oral drill and profited immensely.

Remedial Work. Norman was given the Wilson Process Inventory and Diagnostic tests in addition and his score of 81 showed that the addition process caused no serious difficulties. Errors made were caused by combinations or carelessness, rather than ignorance.

The next day the Wilson Inventory and Diagnostic tests in addition facts were administered. The first two tests

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rather than ignorance.

The next day the Wilson Inventory and Diagnostic tests

in addition facts were administered. The first two tests

showed perfect results. On test 3C

39 + 9	27 + 4	15 + 8
28 + 9	27 + 9	37 + 7
35 + 8	34 + 8	29 + 7

combinations were found to be unknown. Test 4D showed

54 + 7	63 + 8	49 + 6	64 + 7	27 + 4
56 + 7	49 + 5	45 + 6	45 + 8	

to be unknown. This made a total of 18 facts out of a possible 485 in the addition process unknown. These facts were studied from flash cards. After they were known, drill examples supplemented them for more intensive drill. The process from the result of the Process test, showed mastery and after the facts were mastered, addition was dropped.

Result of Addition Tests

	Date	Test	Score	Penalty Score
1.	10/18/32	3P	81	50
2.	10/19/32	3A	100	
	10/19/32	3B	100	
	10/20/32	3C	97	
	10/20/32	3D	95	

The subtraction problems presented the same situation as was found in addition. The Wilson Inventory and Diagnostic tests in subtraction showed facts

61 - 54	33 - 28	55 - 48
62 - 56	24 - 18	33 - 27

52 - 49 to be unknown. The Wilson Process Inventory and Diagnostic test, administered after these seven errors had been learned, showed the subtraction process to need more drill on examples with zeros such as:

showed perfect results. On test 30 38 + 9 37 + 9 37 + 4 15 + 8
 35 + 9 34 + 9 32 + 7

combinations were found to be unknown. Test 4D showed

54 + 7 63 + 8 49 + 8 64 + 7 37 + 4
 58 + 7 49 + 8 45 + 8 45 + 8

to be unknown. This made a total of 18 facts out of a possible

485 in the addition process unknown. These facts were studied

from flash cards. After they were known, drill examples

supplemented them for more intensive drill. The process from

the result of the process test, showed mastery and after the

facts were mastered, addition was dropped.

Result of Addition Tests

Date	Test	Score	Penalty Score
10/18/33	37	81	50
10/19/33	3A	100	
10/19/33	3B	100	
10/30/33	3C	97	
10/30/33	3D	95	

The subtraction problems presented the same situation as

was found in addition. The Wilson Inventory and Diagnostic

tests in subtraction showed facts 61 - 54 53 - 38 55 - 48
 62 - 56 64 - 18 33 - 37

53 - 48 to be unknown. The Wilson Process Inventory and

Diagnostic test, administered after these seven errors had

been learned, showed the subtraction process to need more

drill on examples with zeros such as:

\$10.00	\$25.00	\$4.98	600	1402
<u>5.98</u>	<u>17.05</u>	<u>.99</u>	<u>149</u>	<u>804</u>

This needed extra drill was given and the process was completed.

Results of Subtraction Tests

	Date	Test	Score	Penalty Score
1.	10/27/32	4A	100	
	10/27/32	4B	100	
	10/27/32	4C	97	
2.	10/28/32	4P	81	65

Norman could repeat the multiplication tables very quickly but was not sure of the facts in the 8 and 9 table when given at random. These were drilled upon by flash cards. The division facts were also drilled on at this time in order to facilitate matters when short division was needed. $36 = ? \times 4$ $\frac{42}{7} = ?$ $6 \times 3 =$ $8 \times ? = 48$. The Wilson Process Inventory and Diagnostic Test in multiplication showed the process to be firmly fixed once the facts were known.

Result of Multiplication Test

Date	Test	Score	Penalty Score
11/17/32	5P	97	80

Short division was known, as shown by the Wilson Process Inventory and Diagnostic test with the exception of zeros

$\begin{array}{r} 3 \\ 7 \overline{)3} \end{array}$	$\begin{array}{r} 31 \\ 7 \overline{)2107} \end{array}$	$\begin{array}{r} 57 \\ 4 \overline{)20.28} \end{array}$	$\begin{array}{r} 130 \ 3/ \\ 5 \overline{)5018} \end{array}$	$\begin{array}{r} 89 \\ 9 \overline{)8910} \end{array}$
---	---	--	---	---

These errors were not difficult to drill and master because the difficulty was plainly visible and its correction simple.

10.00 5.88
 122.00 17.02
 14.88 99
 800 149
 1402 304

This needed extra drill was given and the process was completed.

Results of Subtraction Tests

Date	Test	Score	Penalty Score
10/27/32	4A	100	
10/27/32	4B	100	
10/27/32	4C	97	
10/28/32	4P	81	82

Norman could repeat the multiplication tables very quickly but was not sure of the facts in the 8 and 9 table when given at random. These were drilled upon by flash cards. The division facts were also drilled on at this time in order to facilitate matters when short division was needed. $36 = 4 \times 9$ and $48 = 6 \times 8$. The Wilson Process Inventory and Diagnostic Test in multiplication showed the process to be firmly fixed once the facts were known.

Result of Multiplication Test

Date	Test	Score	Penalty Score
11/17/32	5P	97	80

Short division was known, as shown by the Wilson Process

Inventory and Diagnostic test with the exception of errors
 130 8/ 88
 130.28 88

These errors were not difficult to drill and master because the difficulty was mainly visible and its correction simple.

In long division the Wilson Process Inventory and Diagnostic test showed an appalling situation. The child had no conception of the method necessary. All figures of the dividend were not used or else they were brought down in the incorrect order, partial dividends, larger than divisor used giving an extra figure in quotient, no remainders given, final zeros ignored, and quotient figures too large or too small caused many of the errors. The actual multiplication, division and subtraction work was accurate, but Norman had no knowledge at all of the process.

In view of his utter confusion, the long division process was reintroduced step by step to insure understanding. The process steps were written out and precisely followed for each problem. One figure divisors were used first to drill the process and make the steps automatic procedure. 10's, 11's and 12's introduced two figure divisors, then the change was made to 21, 23, 42, etc. The work was taken day by day as if the child had never heard of the long division process. Nothing was taken for granted. Every new difficulty was thoroughly explained before work was given to prevent a recurrence of the old errors. When the method itself had been straightened out the process difficulties such as those caused by zeros and remainders, were straightened out.

In long division the Wilson Process Inventory and Division-
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and remainders, were straightened out.

Results of Division Tests

Date	Test	Score	Penalty Score
12/20/32	6P ₁	63	40
1/14/33	6P ₂	18	0

In the drill on multiplication and division processes, many examples were taken from the Standard Service Series of Arithmetic Books, Grades Four and Five.

10/20/32	30	300 Decade problems none as needed for carrying in multipli- cation to 9 x 9	97	
10/20/32	30	175 Decade problems none as needed for carrying in multipli- cation to 9 x 9	93	
10/27/32	44	55 simple operations no borrowing	100	
10/27/32	45	45 combinations re- quiring borrowing	100	
10/27/32	46	335 of 211 subtrac- tions with remain- ders as needed for short division	97	
10/28/32	47	Subtraction Processes	61	40
11/17/32	57	Multiplication Pro- cesses	57	40
12/20/32	6P ₁	Short Division Pro- cesses	63	40
1/14/33	6P ₂	Long Division Pro- cesses	18	0
5/15/33	Form 2	General Survey	123 (possible scores 125)	

Results of Division Tests

Date	Test	Score	Penalty Score
12/30/32	GP	68	40
1/14/33	GP	18	0

In the drill on multiplication and division processes, many examples were taken from the Standard Service Series of Arithmetic Books, Grades Four and Five.

Summary Record of Tests and Results

Wilson Tests Used as Previously Noted

	Date	Test	Score	Penalty Score
1.	10/18/32	3P Addition Process	81	50
2.	10/19/32	3A Easier Primary addition facts	100	
	10/19/32	3B Difficult and zero combinations	100	
	10/20/32	3C 300 Decade combinations to $30 + 9$	97	
	10/20/32	3D 175 Decade combinations as needed for carrying in multiplication to 9×9	95	
3.	10/27/32	4A 55 simple operations no borrowing	100	
	10/27/32	4B 45 combinations requiring borrowing	100	
	10/27/32	4C 200 of 211 subtractions with remainders as needed for short division	97	
4.	10/28/32	4P Subtraction Process	81	65
5.	11/17/32	5P Multiplication Process	97	80
6.	12/20/32	6P ₁ Short Division Process	63	40
	1/14/33	6P ₂ Long Division Process	18	0
7.	5/15/33	Form 2 General Survey	123 (possible score 125)	

Summary Record of Tests and Results
Wilson Tests Used as Previously Noted

Date	Test	Score	Penalty Score
1. 10/19/32	3P Addition Process	81	50
2. 10/19/32	3A Easier Primary Addition Tests	100	
10/19/32	3B Difficult and zero combinations	100	
10/20/32	3C 300 Decade combinations to 30 + 2	97	
10/20/32	3D 175 Decade combinations as needed for carrying in addition - 2 x 9	95	
3. 10/27/32	4A 55 simple operations no borrowing	100	
10/27/32	4B 45 combinations requiring borrowing	100	
10/27/32	4C 300 of all combinations with remainders as needed for short division	97	
4. 10/28/32	4P Subtraction Process	81	65
5. 11/17/32	5P Multiplication Process	97	80
6. 12/20/32	6P Short Division Process	83	40
1/14/33	6P Long Division Process	18	0
7. 2/12/33	Form 2 General Survey	123 (possible score 125)	

Summary of Case 4. Norman was a child that needed a great deal of drill in arithmetic. He realized this himself and was willing to work.

His real trouble in arithmetic began in the fourth grade with long division. Errors in the other three processes were not common and when they did occur, were caused by ignorance of a few basic facts, rather than by process difficulties. The trouble Norman had with long division was due to lack of a definite program of procedure steps. Once this schedule of steps was set up and followed, the difficulties ironed out.

The child was interested in school and wanted to make a good showing in his class. His family were keenly interested in his work and lent every aid and encouragement to the boy. His failure in arithmetic had been made a family matter as well as a personal one.

It was freely discussed in a helpful way and suggestions for improvement given Norman. His pride provided motivation enough for him. He was glad of the opportunity to correct his mistakes and was more than grateful for the help given him.

The study was started the middle of October, and mastery of the four fundamental processes was completed by the first of March. No real difficulties were experienced in addition, subtraction, and multiplication so that most of the time was given over to the re-learning of division, this work taking approximately three months.

Fractions and decimals were taken with the fifth grade

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Fractions and decimals were taken with the fifth grade

class. The introductory work and drill were in some cases, superfluous, but were done, nevertheless, so as not to break the continuity of the process steps. While fractions had not originally given much trouble, decimals had many confusing aspects to Norman. The process of division especially had been further confused by the fixing of the point. This confusion was eliminated by his repetition of the decimal work with the fifth grade, after the fundamental division process had been completed successfully.

Norman's sixth grade work, especially in percentage had been of poor quality, but readily improved as the errors in the fundamental processes had been eliminated.

The results in the Wilson General Survey Test, Form 2, show Norman's gained ability in arithmetic. Out of 125 examples, he was able to successfully do 123.

Norman's Junior High School course was enormously simplified for him. The bugbear of arithmetic no longer hung over his head as a threat. He gained assurance and self-confidence. He was not dull, he could learn arithmetic as well as the rest of the class. He no longer needed the playground as a field for leadership. He could lead the arithmetic class as well from this time forward.

class. The introductory work and drill were in some cases, superficial, but were done, nevertheless, so as not to break the continuity of the process steps. While fractions had not originally given much trouble, decimals had many continuing aspects to Norman. The process of division especially had been rather confused by the fixing of the point. This confusion was eliminated by his repetition of the decimal work with the fifth grade, after the fundamental division process had been completed successfully.

Norman's sixth grade work, especially in percentage had been of poor quality, but readily improved as the errors in the fundamental processes had been eliminated.

The results in the Wilson General Survey Test, Form B, show Norman's gained ability in arithmetic. Out of 125 examples, he was able to successfully do 123.

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VI. Case 5. Fred

The following data was obtained from the Dearborn Group Intelligence Test, administered May, 1932.

(1) CA 9-10

MA 9-7

IQ 97

School History. Fred is in the fifth grade. His work for the past two years has been a failure in arithmetic. This year it reached the state best described, it would seem, as hopeless. He never achieved even a small degree of success.

In the first and second grade his work, although being of a very poor quality, was sufficient to pass him. However, when formal drill was introduced in the third grade, he failed. Fred's other school work, while not of high grade, was sufficient enough to warrant promotion.

Character of the Child. Fred has been described by his previous teachers, as being a troublesome, noisy child. He must be kept under constant supervision or furore in the room results. He not only fails to get his own work completed but tries to prevent others from doing theirs. He is very boisterous and inclined to show off on all occasions. He delights in attracting attention and needs very little incentive or encouragement for these displays. Since he has failed to obtain recognition through the recognized channels of scholastic or athletic success, he tries to compensate for it by his trouble-

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19 87
MA 8-7
(1) 8-10

Intelligence Test, administered May, 1932.

The following data was obtained from the Desborn Group

some conduct. The first noticeable thing about the child is his "show off" attitude.

Fred is a state ward. Up until the time he entered first grade, he had been in five different homes. Each family was obliged to return him because of his incorrigibility. He has been in the present family for over four years. His foster-mother can give no information as to his parental background. It is known that he has an older brother, and, by strange circumstances, I was able to contact this boy's teacher. He is boarding in a different suburb of Boston than Fred. The boys never see each other but from descriptions, one is the exact counterpart of the other. Fred's brother has given much trouble by his conduct. Lately his acts have been getting out of the "prank" class.

Fred is untrustworthy. Everything in his possession has to be investigated as to its source. He brought his foster-father's gold watch to school and gave it to a classmate. At numerous other times he has been caught taking tools and flash lights from parked cars. These articles he did not keep for himself, but gave away to classmates with whom he is not exceedingly popular.

The third grade teacher, near the end of the year, found Fred was not above taking answers from neighbors papers. This was not entirely necessary because under direct supervision he could do the work correctly at her desk although he required a great deal of time.

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The third grade teacher, near the end of the year, found Fred was not above taking answers from neighbors papers. This was not entirely necessary because under direct supervision he could do the work correctly at her desk although he required a great deal of time.

In the fourth grade, he soon discovered that if he fooled and did not finish his work he had to stay, not for fooling but for his arithmetic as well. As the teacher did not correct the work until after school, he used the little device of putting any numbers down for an answer and thus he was finished before the others. If he fooled that was all he had to stay for.

He takes no pride in his work. He is as seemingly indifferent to an 80% as to a 40% mark. He cannot be shamed into doing his work. The reward type of motivation is the only effective method and then that has to be very remunerative in order to appeal. His attitudes could almost be described as calloused.

He is decidedly unpopular with his classmates because of his conduct. The children have been deprived of so many privileges and treats because of him, that they no longer bother with him. On the playground, unless there is organized play, he is ignored.

Fred's trouble is a social one. He has not the feeling of security that the other children have. No one takes a personal interest in him. He is alone. Things that are done for him are done in the spirit of duty rather than love, and he recognizes this. He tries to compensate for this feeling of being alone and left out by his atrocious behavior. He assumes the indifferent attitude to hide his hurt feelings. He "gets even" with the other youngsters by spoiling their privileges.

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Home. Fred's home could not be described as an ideal spot in which to bring up a boy. The foster-mother is in poor health and complains continuously **either** concerning her health, the neighbors, or the neighbor's pets. Most of the time, however, Fred is the main source of these bewailings. She is a conscientious woman, but her very attitude seems to annoy the child into constant new outbreaks of misbehavior. She has a daughter of her own, age sixteen, with whom Fred is continually quarreling and arguing. It is evident from his conduct that he is jealous of this girl, although she seems to be a very mild type.

The only effective method discovered for punishing Fred, is to make him sit in the dark cellar. Sometimes, what is termed as a beating, is administered. Just how severe this is I have never been able to determine because of conflicting reports. What the foster-mother terms a "big beating", Fred describes as a "slapping". I believe the only reason the family keep Fred and put up with his conduct, is because the money paid for Fred's board is badly needed. They try very hard to make him behave, both in school and at home, so that no complaints will reach his visitor.

Cause of Failure. Fred's failure in arithmetic began with the introduction of formal drill. It was fun to play games with numbers, but he never did learn the combinations. During the third grade, whenever necessary, he counted out the answers because he knew the addition and subtraction process.

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Games of Solitaire. Fred's failure in arithmetic began with the introduction of formal drill. It was fun to play games with numbers, but he never did learn the combinations. During the third grade, whenever necessary, he counted out the answers because he knew the addition and subtraction process.

He learned how to bridge decades and borrow so he was able to get the correct answer. While working under direct supervision at the teacher's desk, he was quick enough in his counting to avoid detection.

The multiplication facts were only partially known. Here the counting was more difficult because with two or more difficult figure multipliers, not only the facts, but the process itself, needed skill. Finally, between his ignorance of the facts, and the necessary processes, he became seriously entangled. This failure only strengthened his "why bother" attitude.

Because of the tottering foundation of multiplication, his progress in division was null.

On this unsatisfactory background of arithmetic Fred entered the fifth grade to begin decimals and fractions.

Procedure. Before anything could be accomplished in the matter of arithmetic, Fred's general attitude toward school and the world in general, had to be replaced by a more wholesome one. The proverbial "chip" had to be removed from his shoulder.

The boy wanted people to like and respect him, but he did not know how to achieve this. His eagerness and enthusiasm usually carried him too far. If his attentions were not immediately returned in a very pronounced way, he became sullen and then went the step further to troublesomeness.

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He was made to realize that people did not instinctively dislike him. It was his unthoughtful actions that aroused antagonism. It was up to him to conduct himself in a manner that would not offend people if he wished for their respect and admiration.

He would try to be pleasant for a few days, but his good resolutions were weak and he often lapsed back to his old behavior.

For good conduct, rewards were promised that were nothing short of bribery. These rewards, however, he did not want the other children to know about. For one so hardened, he was very sensitive about little things. He did not want his classmates to know that he had never been on the Swan Boats or seen the circus or a hockey game. He wanted no one's pity.

While he had no trouble learning the tasks set before him, his greatest job was to learn to live harmoniously with his school mates willingly. Work was taken home night after night. The fact that he was receiving extra help bothered him a little. He wanted no one to get the idea he was a "pet" and in order to dispel this idea, every so often he would have an outbreak of disagreeableness that would certainly stop that notion. His self-consciousness made him feel that everyone in the room was always wondering and thinking about him. It was a long time before he learned to disregard others and what they thought about him. It was really what he knew to be true about himself that was important.

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himself that was important.

Remedial Measures. In November, Fred was given the Wilson Process Inventory and Diagnostic Test in addition. He was able to obtain a percent of 78 on this test although the penalty score (1) was 40. As there was a question of doubt in my mind as to whether the examples had been counted rather than added, I administered the test over again. When the work was done orally, the percent was found to be 28. The penalty score was 10 although the method of procedure was known. Only the first group was found to be entirely perfect. Fred realized what the trouble was and was very frank in admitting he counted when by himself.

I explained the few combinations he really had to learn in order to always get 100% in arithmetic. He realized the time he wasted in counting out the same facts over and over again when he could easily learn them. Small flash cards were made out for the addition facts. These were taken home and studied at night. The next morning before school, they were checked by some reliable child. By the end of November, Fred not only knew his addition facts, but could successfully add any problem in "100% Accuracy in Arithmetic--Addition" (2). The plan contained therein being used for his addition work.

His marks for the Wilson Inventory and Diagnostic tests in addition given the first of December were as follows:

3A	100%
3B	100%
3C	98%
3D	99%

- (1) Wilson Process Inventory and Diagnostic Tests in Arith.
3P Addition--Process Step Difficulties p. 4. Univer. Pub. Co.
- (2) Wilson 100% Accuracy in Fundamentals op. cit.

Remedial Measures. In November, Fred was given the Wilson Process Inventory and Diagnostic Test in addition. He was able

to obtain a percent of 75 on this test although the penalty score (1) was 40. As there was a question of doubt in my mind as to whether the examples had been counted rather than added, I administered the test over again. When the work was done orally, the percent was found to be 88. The penalty score was 10 although the method of procedure was known. Only the first group was found to be entirely perfect. Fred realized what the trouble was and was very frank in admitting he counted when by himself.

I explained the few combinations he really had to learn in order to always get 100% in arithmetic. He realized the time he wasted in counting out the same facts over and over again when he could easily learn them. Small flash cards were made out for the addition facts. These were taken home and studied at night. The next morning before school, they were checked by some reliable child. By the end of November, Fred not only knew his addition facts, but could successfully add any problem in "100% Accuracy in Arithmetic--Addition" (2). The plan contained therein being used for his addition work. His marks for the Wilson Inventory and Diagnostic tests

in addition given the first of December were as follows:

3A	100%
3B	100%
3C	98%
3D	98%

- (1) Wilson Process Inventory and Diagnostic Tests in Arith.
- 3P Addition--Process Step Difficulties p. 4. Univ. Pub. Co.
- (2) Wilson 100% Accuracy in Fundamentals of Arith.

The regular class work during this period was carried on as usual, the extra work being done both after school and at home.

Result of Addition Tests

Wilson Process Inventory and Diagnostic Tests in Addition

Date	Test	Score	Penalty Score
11/1/32	3P	28	10

Wilson Inventory and Diagnostic Tests in Addition

Date	Test	Score	Penalty Score
11/5/32	3A	100%	
12/5/32	3B	100%	
12/6/32	3C	98%	
12/6/32	3D	99%	

His subtraction fact needs were inventoried by means of flash cards. Those cards that were not known were taken home for drill and checked the following morning. After mastery of the facts had been reached, the Wilson Process Inventory and Diagnostic test in subtraction was administered. It was found, in spite of knowing the combinations, his percent was 69, penalty score being 40. Errors were caused most commonly by zeros and nines. Such errors as $\frac{428}{12}$ the last number being omitted, and the following were the most prevalent.

$\frac{700}{368}$ double borrowing	$\frac{876}{396}$ double borrowing with 9's in subtrahend	$\frac{1402}{804}$ unnecessary borrowing
------------------------------------	---	--

The regular class work during this period was carried on as usual, the extra work being done both after school and at home.

Result of Addition Tests

Wilson Process Inventory and Diagnostic Tests in Addition

Date	Test	Score	Penalty Score
11/1/32	3P	28	10

Wilson Inventory and Diagnostic Tests in Addition

Date	Test	Score	Penalty Score
11/5/32	3A	100%	
12/5/32	3B	100%	
12/6/32	3C	98%	
12/8/32	3D	98%	

The subtraction fact needs were inventoried by means of flash cards. Those cards that were not known were taken home for drill and checked the following morning. After mastery of the facts had been reached, the Wilson Process Inventory and Diagnostic test in subtraction was administered. It was found, in spite of knowing the combinations, the percent was 63, penalty score being 40. Errors were caused most commonly by error and nine. Such errors as $\frac{488}{12}$ the last number being omitted, and the following were the most prevalent.

700 double borrowing	876 double borrowing	1402 unnecessary
388	396 with 9's in sub-	804 early borrowing
	trahend	

All of December and January was spent on work in subtraction. The Standard Service Arithmetic Books, 3, 4, and 5, were used for examples in the process, most of which was done after school or after the regular arithmetic assignment had been completed. The remedial work occupied up to the end of January. This amount of time was used because of the numerous problems done.

The last week in January the Wilson Inventory and Diagnostic tests in subtraction were given with the following results:

4A 100%

4B 100%

4C 100%

Result of Tests in Subtraction

Wilson Process Inventory and Diagnostic Tests in Subtraction

Date	Test	Score	Penalty Score
12/16/32	4P	69	40

Wilson Inventory and Diagnostic Tests in Subtraction

Date	Test	Score
1/27/33	4A	100%
1/27/33	4B	100%
1/28/33	4C	100%

When I gave Fred the 81 multiplication flash cards on Thursday night, I told him that he knew most of them, but that he needed to review by himself. This was a gross exaggeration, but in his determination to prove the truth of my statement he mastered them all before the following Monday morning. He met

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The last week in January the Wilson Inventory and Diagnostic tests in subtraction were given with the following results:

4A	100%
4B	100%
4C	100%

Result of Tests in Subtraction

Date	Test	Score	Penalty Score
12/18/33	4A	88	40

Wilson Inventory and Diagnostic Tests in Subtraction

Date	Test	Score
1/27/33	4A	100%
1/27/33	4B	100%
1/28/33	4C	100%

When I gave Fred the 81 multiplication flash cards on Thursday night, I told him that he knew most of them, but that he needed to review by himself. This was a gross exaggeration, but in his determination to prove the truth of my statement he mastered them all before the following Monday morning. He met

me at the school door that morning and insisted then and there that he show me how quickly he could go through the cards. I permitted him to come in and take the Wilson Process Inventory and Diagnostic test in multiplication. His percent on this test was 81, the penalty score being 60. The examples causing the most difficulty, follow:

506 zeros in mul-
129 tiplicand

435 zeros in mul-
308 tiplier

54
270 zeros in both
509 multiplicand
and multiplier

The multiplication facts were reviewed frequently, various forms such as $9 \times ? = 72$, $? \times 8 = 72$, $\frac{72}{8} = ?$ were used.

By the first week in March, multiplication was known. More drill was given later by proving the division problems.

Because of the type of drill that had been used for multiplication: $? \times 4 = 36$, $36 \times 9 = ?$, $\frac{36}{4} = ?$, the even division facts were known, and with very little drill, the uneven facts (9's into 89) were mastered. It was at this time that Fred received his first big discouragement. On test 6P, of the Wilson Process Inventory and Diagnostic test in division, he received a mark of 37, penalty score 20. This was very disheartening to him and it took some time to rally him out of his despondency. He was excused from written arithmetic and allowed to work by himself on this process. He did oral arithmetic with the fifth grade and was present during the explanation of new work but his written arithmetic period was devoted to division work.

His errors in the short division process were most common

me at the school door that morning and insisted then and there that he show me how quickly he could go through the cards. I permitted him to come in and take the Wilson Process Inventory and Diagnostic test in multiplication. His percent on this test was 81, the penalty score being 60. The examples causing the most difficulty, follow:

508	errors in mul-	432	errors in mul-	7081	errors in both
128	typical	308	typical	308	typical
					and multiplier

The multiplication facts were reviewed frequently, various forms such as $8 \times 7 = 56$, $7 \times 8 = 56$, $56 \div 8 = 7$ were used. By the first week in March, multiplication was known. More drill was given later by proving the division problems. Because of the type of drill that had been used for multiplication: $7 \times 4 = 28$, $28 \div 7 = 4$, $28 \div 4 = 7$, the even division facts were known, and with very little drill, the uneven facts (9 's into 89) were mastered. It was at this time that Fred received his first big discouragement. On test 89 of the Wilson Process Inventory and Diagnostic test in division, he received a mark of 37, penalty score 30. This was very disheartening to him and it took some time to rally him out of his despondency. He was excused from written arithmetic and allowed to work by himself on this process. He did oral arithmetic with the fifth grade and was present during the explanation of new work but his written arithmetic period was devoted to division work.

His errors in the short division process were most common

in the following type of examples:

$$0 \overline{9} \quad 7 \overline{2 \frac{1}{3}} \quad 7 \overline{31} \quad 4 \overline{20.28} \quad 9 \overline{5018} \quad 9 \overline{5405}$$

Inspection show that zeros that were ignored or omitted, were the chief cause of difficulty. These required very little drill after the explanation was made.

The transition from short division to long division was accomplished much more easily than anticipated. The long division method with a one figure divisor was used to drill in the process. He enjoyed doing the division this way because he said, "it's a long way of doing something easy". Once he was thoroughly familiar with the process and could do it without any hesitation or reoccurrence of his old errors, we introduced two figure divisors, 10's, 11's, 12's, then 21, 32, 42, etc.

It must be kept in mind that Fred had had long division introduced in the fourth grade. Work had to be carefully gone over in order to check out any of his previous careless habits and avoid confusion. As a check on the long division process, the Wilson Process Inventory and Diagnostic test, 6P, in long division, was given with the results showing complete mastery, 98%, penalty score, 90. The one error made was in subtraction $7 - 8 = 1$, and Fred was able to find this error himself.

During this long division drill, Fred had constantly been reviewing multiplication because all problems worked at home were proved.

in the following type of examples:

$$\begin{array}{r} 8 \\ 0 \overline{) 72} \\ \underline{56} \\ 16 \end{array} \quad \begin{array}{r} 31 \\ 7 \overline{) 217} \\ \underline{21} \\ 0 \end{array} \quad \begin{array}{r} 2 \text{ (5018)} \\ 2 \overline{) 10036} \\ \underline{100} \\ 36 \end{array} \quad \begin{array}{r} 2 \text{ (5102)} \\ 2 \overline{) 10204} \\ \underline{102} \\ 4 \end{array}$$

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Results of Tests in Division

Wilson Process Inventory and Diagnostic Tests in Division

Date	Test	Score	Penalty Score
3/12/33	6P ₁	37	20

Wilson Process Inventory and Diagnostic Tests in Division

Date	Test	Score	Penalty Score
4/13/33	6P ₂	98	90

Since Fred had been doing his regular class arithmetic, with the exception of the written review of fractions which he had made up after school, he was able to begin decimals on a firm foundation and honestly compete with the class in arithmetic for the rest of the year.

Results of Tests in Division

Wilson Process Inventory and Diagnostic Tests in Division

Date	Test	Score	Penalty Score
3/12/33	SP	37	30

Wilson Process Inventory and Diagnostic Tests in Division

Date	Test	Score	Penalty Score
4/12/33	SP	38	30

Since Fred had been doing his regular class arithmetic with the exception of the written review of fractions which he had made up after school, he was able to begin decimals on a firm foundation and honestly compete with the class in arithmetic for the rest of the year.

Summary Record of Tests and Results

Wilson Tests Used as Previously Noted

	Date	Test	Score	Penalty Score
1.	11/1/32	3P Addition Process	28	10
2.	12/5/32	3A Easier Primary addition facts	100	
	12/5/32	3B Difficult and zero combinations	100	
	12/6/32	3C 300 Decade combinations to $39 + 9$	98	
	12/6/32	3D 175 Decade combinations as needed for carrying in multiplication to 9×9	99	
3.	12/16/32	4P Subtraction Process	69	40
4.	1/27/33	4A 55 simple operations no borrowing	100	
	1/27/33	4B 45 combinations requiring borrowing	100	
	1/28/33	4C 200 of 211 subtractions with remainders as needed for short division	100	
5.	2/2/33	5P Multiplication Process	66	60
6.	3/12/33	6P ₁ Short Division Process	37	20
	4/13/33	6P ₂ Long Division Process	98	90
7.	5/15/33	Form 2 Survey Test	119(possible score 125)	

Survey Test Form 2
 118 (possible score 125)

Date	Test	Score	Penalty Score
1. 11/1/33	3P Addition Process	88	10
2. 12/5/33	3A Easter Primary addition facts	100	
12/5/33	3B Difficult and zero combinations	100	
12/5/33	3C 300 Decade combinations to 38 + 2	98	
12/5/33	3D 175 Decade combinations as needed for carrying in multiplication to 9 x 8	98	
3. 12/16/33	4P Subtraction Process	98	40
4. 1/27/33	4A 55 simple operations no borrowing	100	
1/27/33	4B 45 combinations including borrowing	100	
1/28/33	4C 200 of all subtraction with remainders as needed for short division	100	
5. 2/2/33	5P Multiplication Process	88	80
6. 3/13/33	6P Short Division Process	37	30
4/12/33	6R Long Division Process	98	90

Summary Record of Tests and Results
 Wilson Tests Used as Previously Noted

Summary of Case 5. In November, when this case was taken for remedial treatment, Fred could best be described as a boy that harbored a grudge against the world. He was different than the other children in the room. He had no home or his own or parents to look after him and he was frankly jealous of the other's advantages. They all seemed to have so much and he so little. He tried to appease this jealousy by little acts that added discomfort to others.

Everyone was always picking on him, if not for arithmetic, then for conduct. His general work was poor, his arithmetic wretched, and his conduct deplorable. In his own mind, there did not seem much use for him to try hard when everyone was down on him.

The child was first approached on the subject of conduct. A talk that took place between us while watching a school ball game showed in a hundred different ways how he felt about school and his playmates. It was hard for him to see that he was the one and not they that caused the trouble. They did not dislike him for any good cause, but since he had been responsible for getting them into unpleasant situations many times, they had learned from bitter experience to keep away from him and the trouble he usually involved them in.

The subject of his arithmetic trouble presented itself to me during a casual conversation while on a nature walk. I suggested that if he really wanted to clear up his arithmetic troubles, I would be only too glad to help him either before

Summary of Case 2. In November, when this case was taken

for remedial treatment, Fred could best be described as a boy that harbored a grudge against the world. He was different than the other children in the room. He had no home of his own or parents to look after him and he was frankly jealous of the other's advantages. They all seemed to have so much and he so little. He tried to suppress this jealousy by little acts that added discomfort to others.

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The subject of his arithmetic trouble presented itself to me during a casual conversation while on a nature walk. I suggested that if he really wanted to clear up his arithmetic troubles, I would be only too glad to help him either before

or after school. I was convinced that he was just talking for effect. He really did not want to go through with the work, but having brought the subject up, did not exactly know how to decline and still make me feel he was sincere.

The study was started on the basis following. He wanted to get better marks in arithmetic, but did not want to make the effort of learning the facts. It was not until after the work was begun, and he realized how many of the facts he knew and how simple were those he had to learn, that he became enthusiastic.

The work was done almost entirely outside of school hours with the exception of four weeks work on long division. In this way Fred was able to take up new fifth grade material while improving his standing in the fundamentals.

Whenever zeal for the make-up work seemed to lag, rewards were given as a spur. Hockey games, the zoo, and other pleasures did much to urge him on in his work.

He enjoyed the work of gaining arithmetic skills, but more than that he enjoyed the feeling of success in arithmetic. It pleased him to know that some one took enough interest in him to see that his arithmetic difficulties straightened out. He did not want this interest, and its resultant pleasure treats lost by poor work, so he did his assignments at home very faithfully. This perseverance was all that was necessary on his part to bring his work up to a satisfactory level in the fundamental processes.

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lost by poor work, so he did his assignments at home very faithfully.

This perseverance was all that was necessary on his

part to bring his work up to a satisfactory level in the funda-

mental processes.

That the work was successful is proven by the results of a survey test. The middle of May, Fred was given Part 2, of the Wilson General Survey Test, score 119. His addition and subtraction were perfect. In multiplication, two errors were made, one error being caused by addition, the other by moving over two places instead of one before beginning the second line of multiplication. The division error was caused by numbers not being brought down in proper sequence. Fractions were satisfactory, but Fred's knowledge of business situations was woefully lacking. He had no idea of the price of steak or the folly of purchasing "wild cat" oil stock. This was not his fault. There are no stores in the immediate neighborhood so that the children get no purchasing experiences. This practical knowledge will no doubt be acquired later as his experiences broaden.

The results of the work with Fred were very edifying and what was more important to Fred than arithmetic knowledge, was the knowledge he had obtained of his own capabilities and achievement potentialities.

True his conduct had not reformed so completely that he never had to be reprimanded, but no longer did his week's arithmetic mark average 23 or thereabouts. When he fooled, it showed in his mark and his mark was reflected in his face. Very seldom did two failing marks appear on consecutive days.

His feeling of inferiority, the incentive for his mischievousness was gone. He could gain attention through

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legitimate sources and did not have to depend on annoying conduct to call the attention of others to himself.

Of the five children started on remedial work, all obtained one hundred percent accuracy in the four fundamental operations and four were able to completely work up to their right to the fourth grade level satisfactorily. Evelyn Carter had fractions and decimals straightened out because of her illness. By the middle of May, the other four had not only covered the arithmetic requirements of the previous grade, but were able to obtain success in the present grade as well.

The time necessary for the mastery of the four processes varied according to the ability and background of knowledge of each of the children.

Case 1. Stanley had his failures started in the third grade. His addition fact errors began in the first grade. His subtraction errors began in the second grade. His multiplication errors began in the third grade. His division errors began in the fourth grade. His errors were due to lack of understanding of the basic facts and processes. Multiplication gave no unusual difficulties but he had a great deal of time to be spent on that process.

The cause of Stanley's failure in arithmetic, could be traced back to mental laziness and a feeling of despair. By working alone during school hours the remedial work in the four processes was completed by February, having been started in October.

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VII. Conclusion

Of the five children started on remedial work, all obtained one hundred percent accuracy in the four fundamental processes and four were able to completely work up to their present grade level satisfactorily. Evelyn never had fractions and decimals straightened out because of her illness. By the middle of May, the other four had not only covered the arithmetic requirements of the previous grade, but were able to obtain success in the present grade work as well.

The time necessary for the mastery of the four processes varied according to the ability and background of knowledge of each of the children.

Case 1. Stanley had his failures dating back to the third grade. His addition fact and process errors had been partly rectified in the third grade. His subtraction was in very poor condition due to the lack of knowledge of the subtraction facts and processes. Multiplication gave no unusual difficulties but the condition of division caused a great deal of time to be spent on that process.

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Case 2. John's failures dated back to the first grade. Summer school had done much to clear up the addition, subtraction and portions of multiplication. Two and three figure multipliers and all of the division process required much work.

The cause of John's failure was due to ill health and his irregular method of promotion. The remedial work in the four processes required four months of work both in school and at home.

Case 3. Evelyn's addition and subtraction work required no remedial work. Her multiplication errors were not serious. Division caused her real failure.

The causes of failure started in the fourth grade and were undoubtedly due to the fact that she moved and changed schools, irregular method of promotion and ill health. Her work in multiplication and division took more than two months to correct.

Case 4. Norman felt failure in arithmetic in the fourth grade. This was caused by division and was the cause of fifth grade arithmetic failure. His addition, subtraction and multiplication needed some slight attention, but most of the time was devoted to division.

Norman's arithmetic failures were due to his inability to grasp ideas and abstract things quickly. The remedial work completed in four months, put his fundamental processes on a satisfactory basis.

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Case 5. Fred's failure was due to laziness and a feeling of insecurity. Further trouble was caused by a lack of fact knowledge rather than process difficulties. He tried to build multiplication and division without knowing the facts involved. His failure can be traced back to the introduction of formal arithmetic in Grade 3. It took five months to straighten out his difficulties and prepare the way for fifth grade success.

The results of the work done with these children, were very satisfying. Their past errors were not only remedied, but their present grade work put on a satisfactory basis for success.

The former dislike for arithmetic was in most cases, dispelled by a joy in the new knowledge and success which was very gratifying to them.

They were able to reach the goal in every case. Their arithmetic was one hundred percent perfect in the four fundamentals.

One can scarcely close this study without a few general statements relative to the total arithmetic situation in the schools:

1. Since the four fundamentals make up over 90% of adult usage of arithmetic, they should be taught perfectly. Yet few teachers have any adequate plan for teaching the fundamentals for perfect mastery.

Grade 5. Fred's failure was due to laziness and a feeling

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2. Too many teachers have little initiative. They merely mark time. This study has shown clearly that failing pupils can be restored to success and confidence if the teacher is willing to do the necessary work.

Too many schools still have no plan of adjusting work to the pupils, except the plan of failing to promote the child. The better schools are abolishing failure as a means and substituting teaching according to needs, and group adjustment of the children.

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